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The modern journal of classic aeroplanes and the history of flying

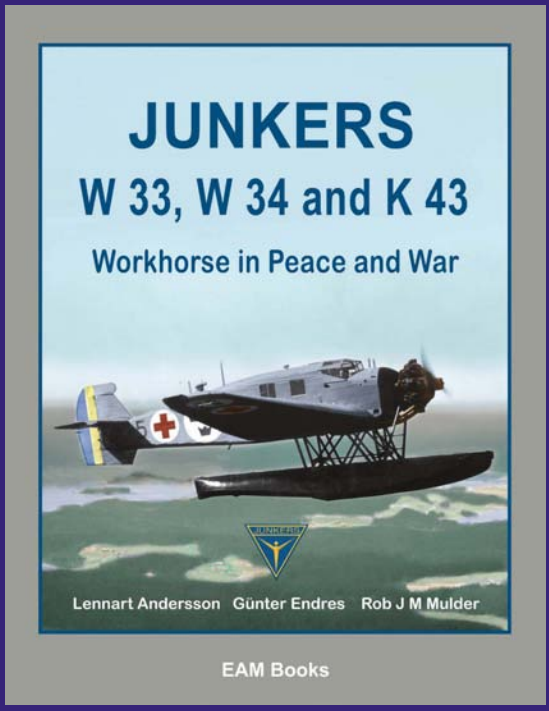
IRRESISTIBLE FORCE

TRUK, 1944: A REVOLUTION IN NAVAL WARFARE

Issue 13

NEW BOOK:
JUNKERS W 33, W 34 AND K 43
Workhorse in Peace and War

When in 1919, less than a year after the devastation of the First World War, the small six-seat Junkers F 13 made its first flight at Dessau in Germany, few would have predicted that it would soon be serving air routes in most parts of the world. As air transport grew, more power, capacity and range was demanded , and this inevitably led to the development of the F 13 into the W 33/W 34, further expanded with the production of the K 43 military variant, as war clouds once again descended on Europe. A total of more than 2,360 aircraft were produced, many as training aircraft for the Luftwaffe, which demonstrates their unexpected success.



Having produced a book that comprehensively describes the F 13, this follow-on work of its successor continues the authors' more than forty years' fascination with Junkers and represents a natural progression. However, destruction of many records and documents during the war years has made the task of reconstructing the aircraft's history much more difficult, but the wealth of information, photographs, colour drawings, facts and figures, and production list will take the reader on a great journey through aviation history.

About the book: 21.6 x 27.9 cm, 272 pages, hard covers, 270 b/w photos, five pages of drawings, many tables and full production list. Colour section with profiles and philately appendix.

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Editor's Letter

HERE AT *TAH* we tend to avoid putting together issues based on a particular theme, but sometimes connections between the features establish themselves independently of any great editorial masterplan. Several stories in this issue, for example, happen to mark significant anniversaries: 80 years ago Qantas opened its first international air service, as related by David Crotty in his article on the often-painful development of the airline's Brisbane—Singapore D.H.86 Express service. Italian aviation historian Gregory Alegi marks the 75th anniversary of the controversial last flight of one of Italy's greatest aviators, Italo Balbo; and 50 years on Melvyn Hiscock celebrates Pan Am Captain Charles Kimes's masterful handling of a severely stricken Boeing 707 loaded with passengers in 1965. The last two both occurred on June 28, a quarter of a century apart — another of those curious connections. Fittingly for this, the 13th issue, luck — good and bad — plays an important part in both stories, fate dealing very different hands to those in each.

We also bid farewell to aviation pioneer Frederick Warren Merriam, whose *Echoes From Dawn Skies* series has formed such an important part of each issue since we introduced it in *TAH6*. When it comes to connections, Merriam is unbeatable. One of Britain's first flying instructors, he knew them all; pilots, designers, captains of industry — everyone who was anyone in British aviation. We've been delighted to be able to share some of the memories of Merriam and his companions — "maniacs!" — as he put it, thanks to his granddaughter Sylvia Macintosh. As Managing Editor Mick beautifully explains: "Reading the material today is the next best thing to teleporting back in time to share a pint with these remarkable men". To which I say "cheers!"

FRONT COVER ***Hell in the Pacific — US Navy Grumman Hellcats, Avengers and Curtiss Helldivers prepare for a strike on the Empire of the Rising Sun in the Pacific in early 1944. Edward M. Young's comprehensive account of Operation*** **Hailstone** ***begins on page 76.***

BACK COVER ***Frederick Warren Merriam, one of Britain's original "magnificent men", beside a Bristol Boxkite at Larkhill in 1913.***

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AIR CORRESPONDENCE

Letters to the Editor

A potential headache

SIR — Being a newcomer to the excellent *TAH*, I have been doing some catching up on back issues and was recently struck by the Boeing KC-97L article in Issue No 9 and, in particular, the photograph on page 42 of the Wisconsin Air National Guard KC-97L displaying at Greenham Common in July 1973.

In 1973 I was the Strike Command solo Hunter display pilot from RAF Chivenor (arguably the best ever RAF station!) and I displayed on both days at the Air Tattoo at Greenham Common. Two things stand out in the memory about that KC-97L and its display. First, when the Wisconsin ANG aircraft arrived at Greenham the crews opened the port rear freight doors to reveal the biggest, plushest, best-stocked bar imaginable. It certainly became the place to be, post-display, as the beer was always cold! It could only happen with the ANG, I guess.

Secondly, the display flown by the KC-97 crew included, as can be seen in the picture, a pass with the refuelling boom fully extended. On one day — I can't remember whether the Saturday or Sunday — I was lined up on the centreline at the eastern end of the Greenham runway waiting to take off while the KC-97 displayed. On this day the captain got the bit between his teeth and came down the runway at very low level with the boom operator seemingly intent on driving the boom tip as low as possible down the runway centreline — *straight at me!*

I have to admit that I was getting very concerned at the sight of the boom approaching at high speed (well, high speed for a KC-97) and only a few feet off the ground and looking like it was really going to hit me. I remember thinking of moving to one side to avoid it but, fortunately, the captain eased up as he got over the end of the runway and the boom whizzed harmlessly over my head — but not by much.

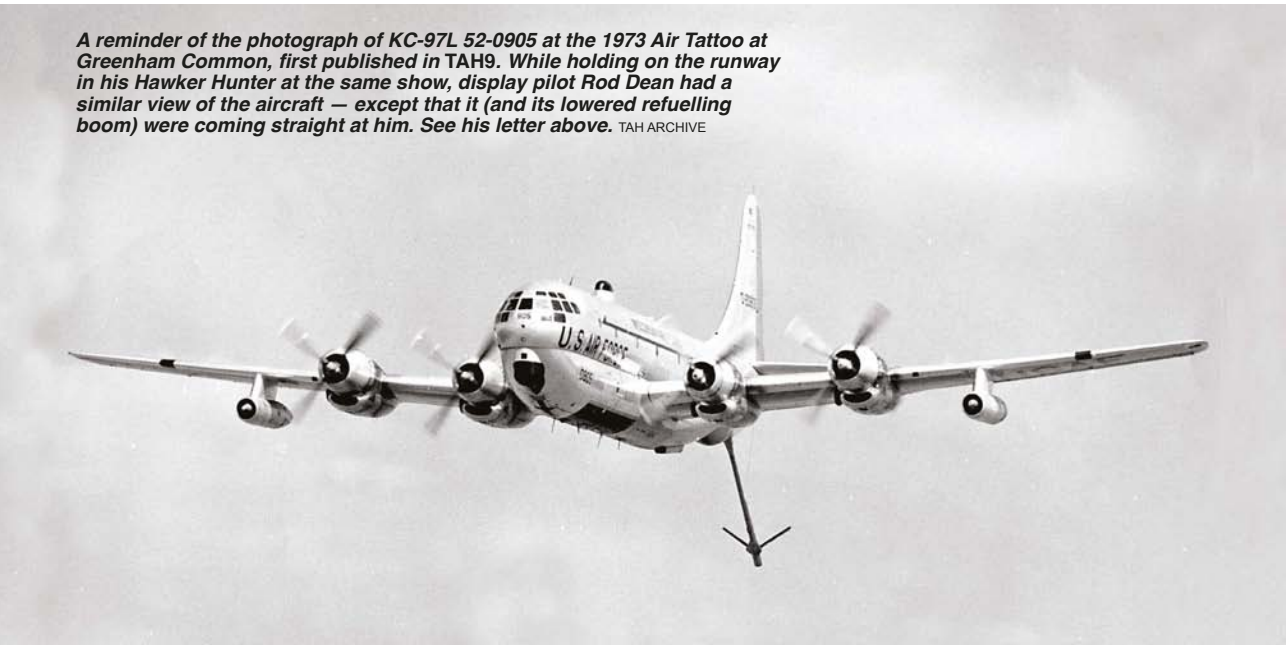
The ANG guys were certainly a "punchy" lot!

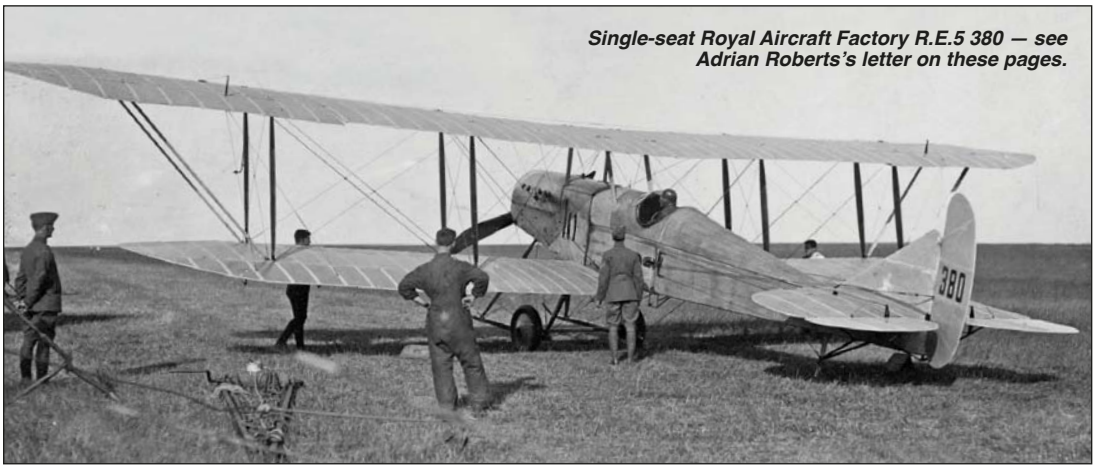
Rod Dean *South Godstone, Surrey*

Busk mystery solved . . .

SIR — In my article on Ted Busk in *TAH9*, I mentioned that he wrote that on March 25, 1914, he flew to 11,000ft (3,350m) in an aeroplane that he described as a single-seater with a water-cooled engine, specially adapted for high-alti-

A reminder of the photograph of KC-97L 52-0905 at the 1973 Air Tattoo at Greenham Common, first published in* TAH9. *While holding on the runway in his Hawker Hunter at the same show, display pilot Rod Dean had a similar view of the aircraft — except that it (and its lowered refuelling boom) were coming straight at him. See his letter above. TAH ARCHIVE





Single-seat Royal Aircraft Factory R.E.5 380 — see Adrian Roberts's letter on these pages.

tude work. Frustratingly, he did not identify the type — and I could not think of an aeroplane that would have been available to him at the time that matched the description.

The answer recently appeared in an article by Paul Hare in the latest Cross & Cockade Journal, Vol 46/1. He was flying a Royal Aircraft Factory R.E.5, which had a water-cooled Austro-Daimler, and what threw me was that this example was a one-off single-seater, c/n 6, later RFC serial 380. Later, Norman Spratt achieved an altitude record with it of 18,900ft (5,760m).

Adrian Roberts *West Wickham, Kent*

. . . but F.5/34 flight date, not yet!

SIR — I hope you don't get to thinking that I will pick holes in every issue, but I have a comment to make on Ralph Pegram's very interesting article *Folland's Forgotten Monoplanes, Part 3* in *TAH11*.

The Gloster F.5/34 seems to be a fated aircraft, since no-one seems to notice that every published reference to the date of its first flight is wrong (including the Putnam volume on Gloster, Derek James's volumes on the Gloster company and the Francis Mason *The British Fighter* book).

While I do not actually know the real maiden-flight date (of which more below), the first prototype (K5604) was flown at the RAF Display at Hendon in June 1937, wearing its "New Types" number 7. Photographs of it, including views in flight, appear in relevant issues of *Flight* and *The Aeroplane*. A colleague tells me that the latter journal for June 9, 1937, had a photograph of K5604 on the ground and stated that "it was now flying".

The picture on page 66 of *TAH11* is an official "RTP" view taken at Martlesham Heath. The negative number is 9614C, date uncertain. The later flights at the Hendon display were made by an RAF pilot from the RAE, and the RAE Flight Log records the collection of K5604 from Brockworth and onwards to Hendon.

Incidentally, the second F.5/34, K8089, was taken on RAF charge in November 1937 and was delivered to Farnborough early in December, again by an RAF pilot. I have the details on file, but not immediately to hand as I write.

Several researchers have been trying to confirm the "real" first flight date, so far without success. Although some Gloster test pilot logbooks do exist, so far we've not been able to turn up the right one.

Phil Butler *Cheltenham, Gloucestershire*

[Author Ralph Pegram replies: "You are, of course, quite correct, but it was an honest mistake by the Editor, who no doubt consulted the erroneous sources you mention when he drew up the captions.

"The standard set of ground shots at roll-out date from some time in May 1937 and some appear in the press at the beginning of June. The famous set of air-to-air shots appears in the press later that month and the accompanying text talks about it having made its first flight 'recently'. From that it appears reasonable to narrow the date of the first flight down to late May, although how you go about proving that I don't know. Do any copies of the Gloster in-house magazine remain from that time, or is there any chance that local papers could have reported a mysterious new monoplane flying out from the factory? Otherwise monthly reports to Hawker management, minutes of board meetings or other records in the Hawker archive may be the way to go."]

Swift response

SIR — Keith Hayward's review of the political background to defence procurement in the 1950s was most interesting. I do think that things weren't helped by the lack of design imagination and initiative in the British industry, which insisted on a very cautious line, when the messages from elsewhere, such as the USA, were "come on in". We could have done better.

But that's not what I'm writing about. Keith talks about the adverse effects of the cancellation of 31 Swift FR.6s at my old employer, Short Brothers & Harland, at Belfast, where maintaining employment was a government objective. But, of course, this wasn't the first cancellation. Shorts was subcontracted to build Comet fuselages and did in fact do so, with at least one Mk 1 being completed in 1955, before the untimely hiatus in the Comet programme, when the contract was terminated. Around the same time — I have no dates — it is believed that at least four Swift F.2 fuselages were completed, but there are no company photographs providing confirmation. A total of 140 F.2 aircraft was ordered to Contract 6/A/8509 on August 16, 1952, with serials in blocks between XA957 and XB241 (Phil Butler, Air-Britain *Aeromilitaria*, Winter 2013) and, I believe, with the wings to come from elsewhere. Of course, the order was cancelled, the Swift F.2 being a non-starter. What is curious, given that there must some people alive today who should remember these Swifts, is that we have no proper record of what actually happened regarding Swifts at Belfast.

Back in 1962 I visited the famous scrapyard at Droylsden in Manchester where an uncompleted Swift F.2 fuselage was to be found. Alongside was the rather more famous Swift F.4 WK198, one-time holder of the world air speed record (now to be seen at Brooklands). As much of the scrapping done in Northern Ireland was contracted to English companies, it seems quite likely that this uncompleted fuselage was one built by Shorts. I wasn't smart enough to check the inspection stamps at the time and have been wondering ever since. Who knows where it came from?

Graham Skillen *North Cheriton, Somerset*

Wot no RAF?

SIR — I enjoyed the article on the island of Vis (*TAH12*), but was mildly disappointed at the very sparse mention of the RAF. In fact, the impression was given that the airfield was specifically there to serve as a scrapyard for crippled USAF heavies that would never make it back across the Adriatic to Italy.

The reality was that Vis was an operational (albeit somewhat primitive) RAF airstrip, serving originally as a forward base for Balkan Air Force fighters and fighter/bombers from

Mark it on the calendar — "must buy new calendar" . . .

WITH THE END of 2015 fast approaching, it's time to start planning for next year — so here is a selection of aviation calendars to consider for your wall. The two larger ones (20in x 14in) are the famous GHOSTS calendars created by veteran air-to-air photographer Philip Makanna, featuring various World War One and World War Two subjects respectively. Order them for $14.99 + p&p apiece from www.ghosts.com or GHOSTS, 665 Arkansas Street, San Francisco, CA 94107, USA. The smaller one (8¼in x 11¾in) is the Cross & Cockade International calendar, featuring paintings of World War One subjects by 12 different artists. It is available for £10 + p&p from www.crossandcockade.com or by post from Cross & Cockade International, Hamilton House, Church Street, Wadenhoe, Peterborough PE8 5ST.

The remains of a Supermarine Swift in Manchester's Droylsden scrapyard — see Graham Skillen's letter opposite.

airfields in Italy, and later, in 1944, housing detachments from various squadrons (Nos 6, 73, 249, 253 and 1435, and the two Yugoslav squadrons, Nos 351 and 352), flying Hurricanes, Spitfires and Beaufighters.

In spring 1945 all these units, with the exception of 1435, moved to mainland Yugoslavia, where they saw out the war.

Don Minterne *Dorchester, Dorset*

[Our coverage of Vis was indeed written largely from the perspective of the seriously damaged USAAF "heavies" which used the primitive strip on the island as a boon when struggling back from raids on the oil refineries in the Balkans and South-eastern Europe. There is, however, undoubtedly another equally fascinating story to be told about the operations of the Yugoslavian-manned fighter units of the RAF and its own squadrons based on Vis — I feel a follow-up article coming on! — Ed]

A Wimpy on Vis island

SIR — I read with interest the account in Issue 12 of the US Fifteenth Air Force's use of the emergency airfield on the Yugoslav island of Vis. For the record it might be noted that bombers of the Royal Air Force's No 205 Group, based on the plain around the city of Foggia, and often sharing bases with the Fifteenth Air Force, also used Vis as a refuge on occasion. One such was that of Flight Sergeant Vic Claney and his Wellington crew from No 40 Sqn, who landed on Vis on December 4, 1944. Many years ago Vic wrote the following about the experience:

"We were briefed for a daylight operation to drop supplies to Tito's partisans at 'Ballinclay' (Bugogno), and while we were dropping I noticed that the oil pressure in the port engine was falling. After we came off the drop zone I asked my bomb aimer, Reg Moody, to have a look at the engine from the astrodome. He reported that it was gushing oil, so I put 'George' in and went to have a look. The engine was gushing oil. I didn't fancy feathering the prop, as we had to climb over the mountains to get back to the Adriatic, so I told Reg to keep pumping oil from the reserve tank for as long as he could. We got back to the coast as quickly as possible and I decided to try for Vis, rather than to try to make Italy on one engine. I asked Junior Pearce (the WOp) to let base know what I was going to do and off we went. (I can still see the rest of 205 Group disappearing into the sunset).

"As we approached Vis I decided to go straight in rather than risk a circuit, and as I was on approach put my wheels and flaps down at the last minute. As I did this, three Hurricanes shot past me as they were climbing away! This

indicated that I was attempting to land downwind — not very clever! However, I had no choice, so went straight in. The airstrip was of the metal American construction, but we landed quite safely, and didn't run out of runway. As we stopped our landing run, the engine seized!

"We were entertained by a groundcrew of RAF personnel who serviced the Hurricanes we had seen. I seem to remember that they were flown by Partisans. After a couple of days a Dakota from Bari came for us, and we were then ferried back from Bari to Foggia Main by one of the squadron aircraft — a fine end to our second operation! I never did hear what happened to the Wimpy, but I ceased to be Vic Claney and became Vis Claney."

Vic's Wellington X, LP136/Q, never made it back to 40 Sqn, and almost certainly was not repaired, since 205 Group was in the process of converting from Wellingtons to Liberators, and there were plenty of spare Wimpys for the two squadrons still operating the type, Nos 40 and 104. The aircraft was struck off charge on August 8, 1945, almost certainly by inventory entry.

Congratulations on the consistently high quality of material in *The Aviation Historian*. Long may the magazine flourish.

David Gunby *Christchurch, New Zealand*

They're trying to tell you something . . .

OUR TRIBUTE TO the late David Lockspeiser in *TAH8* included the story of how the designer and test pilot was prevented from demonstrating his Lockspeiser Land Development Aircraft on the last commercial day of the 1975 Paris Air Show — by a swarm of bees which settled on the canopy moments before he could climb aboard. The photograph **BELOW**, which has subsequently come to light, captures the scene, as an airport fireman tries unsuccessfully to sweep the swarm into a plastic crate, rather diverting visitors' attention from Tupolev Tu-144 CCCP-77144 and Ilyushin Il-76 CCCP-76500/366 in the background. The bees, which were eventually washed off using fire-extinguisher foam, actually did Lockspeiser a big favour, because when he was taxying the LDA later that day the starboard main undercarriage leg sheared off owing to a welding fault. Had it happened on take-off or landing on the demo flight, the consequences could have been serious — both personally and commercially.

TAH **Announcing our 2016 Reader Holiday . . .**

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A Mil Mi-26 and two Mil Mi-8s over Red Square, St Basil's Cathedral and the Kremlin at the time of the 2015 Victory Day parade.

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The SINGAPORE EXPRESS

QANTAS EMPIRE AIRWAYS & THE D.H.86 SAGA

80 years ago Qantas opened its first international passenger air route when a de Havilland D.H.86 departed Brisbane for Singapore as part of the newly-minted Qantas Empire Airways service between Australia and Britain. Development of the "Express" had not been easy, however, as Qantas Heritage Collection Curator **DAVID CROTTY** explains . . .

"We have the chance now to engage in a part of one of the greatest Empire transport developments in history . . . besides the saving of the Qantas company from virtual extinction. The outcome of affairs hinges around the next few months . . ."

Wilmot Hudson Fysh, co-founder and managing director of Qantas, 1933

IN APRIL 1935 Qantas commenced international air services from Australia, when the first passengers journeyed between Brisbane in Queensland and Singapore. In keeping with the times, this was an Empire project, a partnership with Imperial Airways to connect Australia and Britain via India, primarily for the carriage of mail, with passengers taking up the remaining payload capacity. For Qantas, it was not just about expansion — it was a matter of survival, as managing director Wilmot Hudson Fysh made clear in the words at the top of this page in a report to the Qantas board in late 1933 .

By this stage, negotiations between fractious Australian commercial aviation interests to form a single entity to operate the service to Singapore had failed in the face of resistance to Imperial Airways taking a stake in the proposed new operating company. Fysh and his chairman, Fergus McMaster, had no such qualms, however, and in January 1934 Qantas Empire Airways (QEA) was formed, with Qantas and Imperial Airways each holding 49 per cent of the new company. The remaining two per cent went to Australian scientist Sir George Julius as an independent "umpire", who Fysh later recalled "never had to blow his whistle".

THE LOGICAL CHOICE

There was much riding on the selection of a suitable aircraft for Qantas to operate to Singapore. For Fysh, the choice of supplier was obvious. Since the early 1920s Qantas had enjoyed a close and successful association with the de Havilland Aircraft Co Ltd. This went well beyond the usual client relationship. Having opened services with secondhand D.H.4 and D.H.9 biplanes, Qantas purchased new D.H.50A aircraft and obtained a licence agreement to build D.H.50As, D.H.50Js — and a single D.H.9 — at Longreach in central Queensland. The sturdy D.H.50 enabled the airline to build its route network in Queensland and establish a reputation for safety. Qantas later obtained D.H.61 Giant Moths, fondly remembered as the first Qantas aircraft to be equipped with an onboard lavatory.

In the late 1920s Qantas opened a flying school at Eagle Farm in Brisbane using a fleet of D.H.60 Moths, the type that transformed de Havilland from a boutique concern to the world's best-known aircraft manufacturer. Qantas also acted as an importer and agent for de Havilland sales in Queensland. While visiting Britain in September 1933, Fysh wasted no time in placing an order for a new four-engined design from de Havilland, to be called the D.H.86 Express, informing McMaster by cable that he had "secured exclusive output Havilland four-engine aircraft reasonable price greatly superior performance". This was justified by his conviction that the selection of obsolete machines would lead to ridicule. The order was subject to QEA being successful in securing the all-important airmail contract.

The pressure to be "up to date" was keenly felt, with the recent development of the all-metal monocoque Boeing 247 and Douglas DC-2 setting new standards in design, performance,

PHILIP JARRETT COLLECTION

ABOVE ***The prototype D.H.86 "Express Air Liner" with its B Conditions registration E.2 around the time of its first flight in January 1934, a mere four months after the decision was taken to proceed with the design. Note the original single-pilot "Roman" nose. Later examples were fitted with dual controls and a revised longer nose profile.***

operating cost and passenger comfort. British manufacturers were under considerable pressure to offer a competitive design and Fysh had the opportunity to sample the competition during his return journey to Australia in late 1933, when he travelled overnight on a United Airlines Boeing 247 between Chicago and San Francisco. He wrote to George E. Woods Humphery (**INSET BELOW RIGHT**), Managing Director of Imperial Airways, opining that "all these high-speed machines here make everything look out of date in England", but added reassuringly that Imperial's flagship aircraft, the Handley Page H.P.42, remained "supreme in its class".

Fysh maintained a close watch on the development of the D.H.86, both through his close working relationship with Woods Humphery, and by sending his most senior pilot and trusted technical adviser, Lester Brain, to Britain in May 1934 to oversee production and test-flying on behalf of Qantas. Brain provided a constant flow of information to Fysh who, despite his close association with de Havilland in the past, wanted to maintain an independent assessment of the stated and actual performance of the new aircraft. Qantas had been badly let down in 1921 by the failure of the Vickers Vulcan biplane it had ordered off the drawing board and bad memories of the experience still haunted Fysh.

EXPRESS DEVELOPMENT

The rapid development of the D.H.86 would be possible only by modifying an existing design, the twin-engined D.H.84 Dragon. The manufacturer described the new design as "a logical development" of the D.H.84. In late September 1933 Fysh had met with de Havilland representatives in England to discuss design requirements, including engine specifications. The use of four Gipsy Major engines, as fitted to the D.H.84, was proposed instead of the as-yet untried Gipsy Six. Successful initial tests of the Gipsy Six just a few days later provided some reassurance. As a backstop the D.H.84 fitted with uprated engines was also considered. Delivery of the first production D.H.86 was promised seven months from the placement of an order.

The prototype D.H.86, E.2/G-ACPL, made its maiden flight in the hands of Hubert Broad on January 14, 1934, just within the contracted deadline. Flight testing was performed at the RAF's Aeroplane & Armament Experimental Establishment at Martlesham Heath in February 1934. The report was generally favourable but the design of the tail-trim gear was criticised for its low gearing and lack of adjustment, which was "insufficient to trim the aircraft throughout the speed range over the full c.g. [centre of gravity] travel".

Of more concern to Fysh was the news that the D.H.86's landing speed was greater than initially predicted owing to the lack of flaps. A warning sign for Fysh that de Havilland was under stress from a rapidly escalating workload was the failure of several Gipsy Major engines in Australia owing to clearances of bearings "being out to an extraordinary degree". He told Woods Humphery in May 1934 that "the present reported rush in

QANTAS HERITAGE COLLECTION

ABOVE ***Despite QEA's input into the design of the D.H.86, the first example in Australia was the first production machine, the single-pilot VH-URN, named*** **Miss Hobart,** ***for Holyman's Airways, which was delivered in July 1934. The aircraft operated between Melbourne and Hobart on Tasmania until it was lost in the Bass Strait that October.***

the D.H. factory worries us and it is felt that very strict inspection should be insisted upon". By this time de Havilland had also committed to design and build the D.H.88 Comet racing machines for the MacRobertson Trophy Air Race from Britain to Australia in October 1934. Fysh expressed concerns that this placed yet more pressure on the de Havilland works.

Lester Brain flew the D.H.86 for the first time on July 3, 1934, at Croydon and formed a mostly good opinion of its flying qualities. Contrary to previous accounts that it was at Brain's insistence that the single-pilot cockpit be changed to dual controls, this modification had already been decided upon in May at the direction of the Australian Civil Aviation Board, which Fysh fully supported for safety reasons. The lack of flaps to reduce the type's landing speed was a critical issue for Qantas. Landing performance in the high temperatures at the small airfields at several of the outback fuel stops along the Brisbane—Singapore route would be marginal at the aircraft's proposed landing speed of 67 m.p.h. (108km/h). The flat approach required would also hinder operations at some locations. Brain identified this shortcoming after his first flight, informing Fysh that "the glide is extremely flat and the float bad".

Like most aircraft designs, the D.H.86 specification walked a tightrope of conflicting requirements. The need to reduce weight to increase payload capacity for airmail over long distances from often inadequate airfields on the Brisbane—Singapore route meant that the aircraft's construction was lighter than ideal. Woods Humphery was well aware of the problems this entailed, telling Fysh in June 1934 that there was "a compromise of a large number

The first of QEA's D.H.86s, VH-USC, at Cairo on September 26, 1934, on its eastbound flight from the UK to Australia. The aircraft arrived in Brisbane on October 13, having covered 12,819 miles (20,630km).

PHILIP JARRETT COLLECTION

PHILIP JARRETT COLLECTION

ABOVE ***Named* Canberra *in QEA service, VH-USC (c/n 2307) was fitted with dual controls and the revised nose profile, as were all six of QEA's examples. The aircraft went to MacRobertson-Miller Aviation in July 1938 and was impressed by the RAAF as A31-5 on the outbreak of war, during which it undertook supply flights in New Guinea.***

of opposing factors, and in particular, I think perhaps you would not call the aircraft of very robust construction".

RISING TEMPERATURES

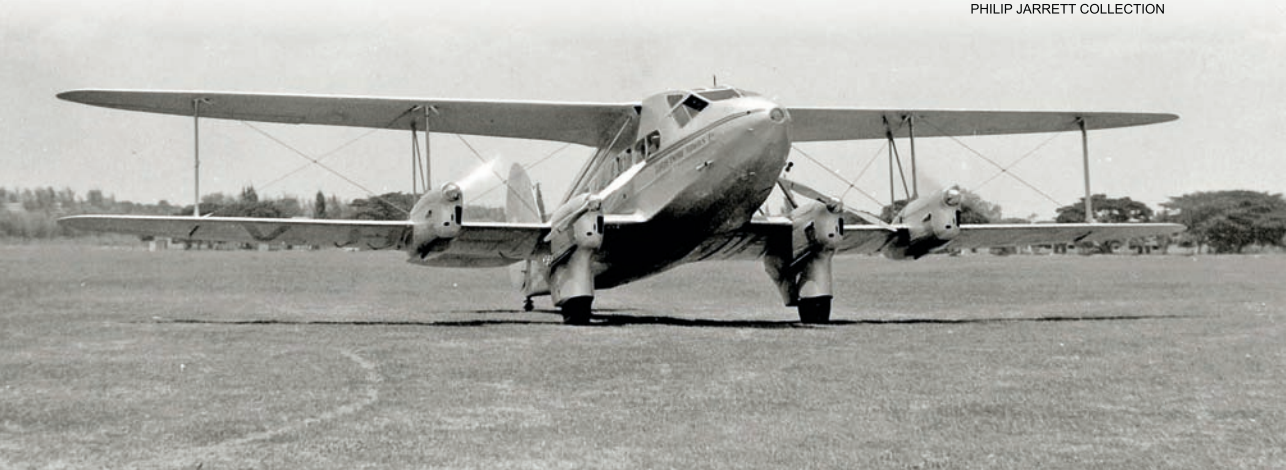
By late July 1934 the relationship between Imperial/QEA and de Havilland had deteriorated to the point that Woods Humphery wrote to inform the manufacturer of the airline's intention to review the contract and call a joint meeting of the boards if concerns over the performance of the D.H.86 were not addressed. There was an element of theatre about this threat but the frustration of both airlines was real. The manufacturer was slow to take responsibility for the shortcomings of the aircraft and provided no reassurance that it had any intention to rectify them. In a letter to C.G. Grey, Editor of *The Aeroplane*, Fysh referred to the D.H.86 as a "rush job".

The threat to review the contact had the desired effect. The manufacturer agreed to fit flaps but these would be supplied as kits to be installed after delivery of the first batch of six QEA D.H.86s. Qantas was committed to the type regardless and was busy finalising details for the naming and liveries of its machines. The first D.H.86 airmail service from Brisbane to Singapore was set for December 1934 and the delivery schedule was tight; so much so that the first aircraft would have to be delivered by air rather than by sea.

Lester Brain, along with First Officer R.U. Price, flew the first Qantas D.H.86, VH-USC, from Britain to Australia between September 24 and October 13, 1934. A spare Gipsy Six engine, tools and spare parts were carried in the rear compartment. While Fysh reported that the trip was "uneventful", Brain was concerned about the performance of the machine at what Fysh admitted was "close to its maximum permissible all-up load". The known problems with landing

BELOW ***With its inner Gipsy Six engines stopped to minimise wear and tear and conserve fuel, VH-USC taxies in under the guidance of QEA chief pilot Lester Brain at Darmo aerodrome in Sourabaya on Java during its ferry flight from the UK in October 1934. The second and third QEA D.H.86s were delivered by sea rather than flown.***

PHILIP JARRETT COLLECTION



PHILIP JARRETT COLLECTION

ABOVE ***A superb illustration of the rather primitive facilities the D.H.86 had to face on the Brisbane—Singapore service, this Shell Company photograph shows VH-USC at Talang Betutu aerodrome at Palembang on Sumatra. The first of QEA's D.H.86s was returned to QEA in May 1942 but was lost in a crash at Darwin on October 10, 1944.***

speed and approach angle were accepted with the understanding that these would be rectified once flaps were fitted. Take-offs were also a concern as the aircraft had a marked tendency to swing if the throttles were not handled carefully.

The stage was set for the successful introduction of the D.H.86 on Australia's first international air route. However, the period between October 1934 and February 1935 was to prove tumultuous. Just over a week before Brain delivered the first D.H.86 to Brisbane, a Qantas D.H.50J crashed at Vindex station near Winton in western Queensland. The pilot, Norman Chapman, and two passengers died and no cause could be determined. Chapman was a respected senior pilot and had been selected for a D.H.86 command on the Singapore service.

October 1934 also saw the victory of the D.H.88 Comet flown by former Qantas pilot Charles Scott and Tom Campbell Black in the MacRobertson race to Melbourne. The KLM Douglas DC-2, *Uiver,* which finished in second place, attracted just as much attention, being the first of the new generation of modern metal American monoplane airliners to arrive in Australia. The speed of the DC-2 caused press comment which reflected poorly on the Imperial/Qantas service. Woods Humphery and Fysh were once more on the defensive, pointing out the safety advantages of the four engines offered by the D.H.86.

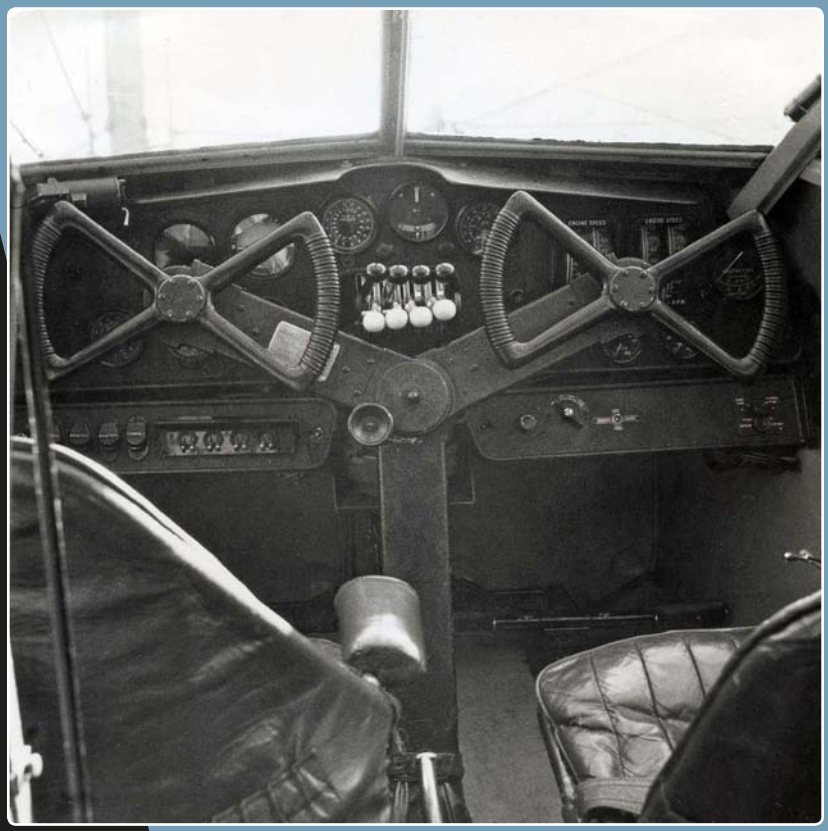
SERIOUS SETBACKS

Then, on October 19, D.H.86 VH-URN, *Miss Hobart*, operated by Holyman Airways, disappeared over the Bass Strait on a scheduled flight between Launceston and Melbourne with ten crew and passengers aboard. Among those lost was the Rev Hubert Warren, whose son David later invented the flight recorder that has proved so critical to more recent accident investigation. The Holyman D.H.86 was an early single-pilot

The remains of D.H.86 VH-USG near Longreach in Queensland following its crash on November 15, 1934, during its ferry flight from the UK. Capt D.R. Prendergast and his crew, plus a Shell representative, were killed, causing an investigation into the type's fin-trim mechanism.

QANTAS HERITAGE COLLECTION

PHILIP JARRETT COLLECTION



TAH ARCHIVE

ABOVE ***The cabin of QEA's D.H.86s could accommodate up to ten passengers and a mail load, with dual controls for the Captain and First Officer. The fuselage structure of the Express followed standard de Havilland practice, incorporating the usual unobstructed plywood box with spruce stiffening members and soundproofing material on the outside covered over with fabric.***

RIGHT ***The dual cockpit fitted within the elongated nose of the QEA D.H.86s was relatively simple, with the throttles for the four Gipsy Six engines located centrally, the basic flying instruments ranged to the left for the pilot in charge and — unusually for the time — ribbon indicators for the engine r.p.m. on the panel directly in front of the First Officer's seat.***

PHILIP JARRETT COLLECTION

ABOVE ***Lester Brain (middle) poses with First Officer R.U. Price (left) at Talang Betutu during the delivery flight of VH-USC in October 1934. Brain had joined Qantas in 1924, becoming the airline's chief pilot in 1930, and went on to become the linchpin for Qantas operations during World War Two before joining de Havilland after the war.***

version and had been in service only since October 1. Fysh was unhappy that Holyman had trumped Qantas by being the first to operate the D.H.86 in Australia but de Havilland was obliged because Holyman had placed a firm order before Qantas could confirm its commitment.

The loss of *Miss Hobart* in unexplained circumstances was followed less than a month later by the greatest single blow to the new service. The fifth Qantas D.H.86, VH-USG, crashed near Longreach in western Queensland on November 15, during its delivery flight from Britain. The three Imperial Airways crew members and a Shell company representative being carried as an unauthorised passenger were killed. The aircraft was again heavily laden with a spare engine and parts. As the flight engineer was found in the pilot's seat and the pilot was in the rear lavatory, initial suspicions focused on possible loss of control with an aft c.g. shift. Woods Humphery wrote to Fysh, who immediately adopted Imperial policy that placed restrictions on entry to the cockpit by requiring a written pass.

The discovery of the broken tail-trim mechanism with the fin displaced sideways then caused the focus of investigations to shift. Over several months Qantas chief engineer Arthur Baird conducted a detailed investigation into the fin-trim mechanism with disturbing results. The latest technology was adopted, with "television" images of the trim mechanism transmitted by beam wireless back to Britain. This technology was first used to send newspaper images of the MacRobertson air-race winners to Britain just hours after Scott and Campbell Black crossed the finishing line at Melbourne's Flemington racecourse.

HISTORY REPEATING ITSELF

Examination of the fin-trim adjustment of the D.H.86 revealed wide variations between individual aircraft. The Longreach aircraft, VH-USG, was found to have a bias screw out of position forward by 3/16ths of an inch. After removal from its crate following shipment by sea, VH-USD was found to have a similar fault with a cracked fin post. The bias screw on VH-USE was also slightly out of position.

While at Singapore, during its delivery flight in January 1935, VH-USF was found to have its bias screw out of position 3/16ths of an inch too far to the rear. This was despite modifications by de Havilland, although Fysh noted that "the box-fitting incorporated as a modification was all that saved a fracture of the bottom end of the fin post and a repetition of the Longreach accident". Fysh informed Imperial that three of the five aircraft examined revealed faults that "might reasonably be expected to seriously endanger the safety of the aircraft concerned".

The Longreach crash unsurprisingly caused the suspension of the introduction of the D.H.86 on

MAP BY MAGGIE NELSON

the Qantas Singapore service, and the inaugural mail flight from Brisbane was flown by two D.H.61s and a D.H.50J on December 10, 1934. This terminated in Darwin, where an Imperial Airways aircraft carried the mail on to Singapore. Fysh informed Woods Humphery that "History is repeating itself in that the original Qantas route was started up in 1922 with a lot of old junk because we refused to accept the Vickers Vulcan".

Apart from the frustration involved, Fysh was also well aware that a failure to resolve the faults with the D.H.86 could result in the withdrawal of permission from the Civil Aviation Branch to operate the aircraft "for all time". There were other problems too. Fysh recruited well-known aviator P.G. Taylor to fill the vacancy left by the death of Chapman. Taylor had just completed the first west—east flight across the Pacific with Sir Charles Kingsford Smith in Lockheed Altair *Lady Southern Cross*. While in London on his way back to Australia, Taylor received news about the Longreach accident and made comments in the British press. Taylor informed Fysh by cable that he would "not on principle fly 'eight six' under any circumstances. Can I assist you any negotiations here?" An exasperated Fysh replied soon after: "Regret your comment without full knowledge accident . . . as unwilling to fly aircraft feel mutual wish cancel previous arrangements join us which we now confirm". Taylor had been critical of British aircraft and, along with Kingsford Smith, had lobbied to lift import restrictions on American aircraft into Australia.

Fysh communicated the results of the Qantas investigation into the fin-trim mechanism to the relevant authorities. Edgar Johnston, Controller of Civil Aviation, was "wholly unconvinced" that this was the sole cause. The Civil Aviation Branch conducted its own tests and cleared the D.H.86 for service in late January 1935. Fysh knew that any further incident would finish the career of the D.H.86 with Qantas for good. He urged an ultra-conservative approach to operating the aircraft which began mail flights between Brisbane and Singapore on February 26, 1935. Passenger flights began on April 17, with Lady Edwina Mountbatten on the first flight to Singapore.

"DOUGLASITIS"

By March 1935 the crisis was past. After a period of sick leave caused by the strain of the previous few months, Fysh was confident that the worst was over and Qantas could begin international operations with confidence. In June 1935 de Havilland paid Qantas £4,000 as an *ex gratia* settlement of all outstanding claims.

The D.H.86 crisis provided ammunition for those seeking to operate American aircraft in Australia. "Douglasitis", as Fysh termed it, had even taken hold at Qantas. Fysh himself became a firm believer in the all-metal monoplane and urged British firms to get up to date with the

PHILIP JARRETT COLLECTION

BOOKLET: QANTAS HERITAGE COLLECTION

ABOVE ***Originally built to an Imperial Airways order as G-ACWE, D.H.86 VH-UUA (c/n 2306) was transferred to QEA after the loss of VH-USG, and became*** **Adelaide** ***in QEA service. It later went to India to operate with Tata Airlines as VT-AKM and was impressed into RAF service as HX789 in July 1942.***

RIGHT ***A contemporary QEA information booklet on the airline's Brisbane—Singapore service covering a route of more than 4,360 miles (7,015km).***

design of the large flying-boats that were intended to take over from the D.H.86, which had been intended only as interim equipment. Advocates for the DC-2 overlooked problems with the aircraft, including an unexplained accident in Iraq that caused the loss of *Uiver* and all those aboard in December 1934, just a month after the MacRobertson race. Ernest K. Gann, in his book *Fate is the Hunter*, also catalogues the challenges of flying the DC-2, especially the landing of these "stiff-legged brutes".

Reflecting on the D.H.86 crisis, Woods Humphery wrote to Fysh that "Douglasitis has been a very stirring tonic and we ought to be very much indebted to the Americans and to the Dutch for stirring up some of our designers". In turn, Fysh reflected that "a gamble was necessary or else someone else may have had the Brisbane—Singapore route instead of IAL and Qantas. The whole business of supplying the machine and the rush to start the route was too hurried".

Operated strictly within conservative limits, the D.H.86 proved to be a reliable and safe aircraft in Qantas service on the Brisbane—Singapore route until August 1938, when Short Empire flying-boats began operating between Sydney and Singapore. The D.H.86 was then used on the Qantas Inland Service.

The D.H.86 has never shaken off the suspicion that its design was inherently flawed. From the evidence available there is nothing to suggest that this is true. However, owing to the pressure of other work and the tight timescale to have the aircraft ready for service, de Havilland failed to ensure that basic quality control and inspection was undertaken, as evidenced by the tail-trim variations found in the Qantas fleet. Fysh bluntly informed Francis St Barbe, de Havilland's Sales Manager back in the UK, that "to what extent the rush over the Comets came into the picture, I cannot say", but "bad workmanship left no margin for safety".

SÖLVE FASTH

TO AFRICA IN A BARREL

Although the Saab J 29 Tunnan — "Flying Barrel" — never fired its guns in anger over its homeland, it did become Sweden's first — and only — jet fighter ever to see active combat. **LEIF HELLSTRÖM** uses the testimony of those who flew the portly fighter to tell the full story of the Swedish contribution to UN operations during the 1960s "Congo Crisis"

TOP: LENNART POIGNANT / ABOVE: CARL-GUSTAF WESSLÉN

CLOCKWISE FROM LEFT ***A pilot of* Flygvapnet *unit F 22, formed in 1961 specifically for operations in Congo, climbs aboard a J 29B for a sortie over Katanga province; UN troops in a VW Combi van encounter a "Flying Barrel" at very close quarters during Congo operations; pilot Axel Barthelson (right) and groundcrew chief Curt Jönsson (left) at Kamina.***

THE BELGIAN CONGO gained independence in June 1960 to become the Republic of Congo, also known as Congo-Léopoldville (the Democratic Republic of Congo from 1964), not to be confused with the identically-named Republic of Congo, or Congo-Brazzaville, its direct neighbour on the northern side of the Congo river. As a result the country was immediately thrown into chaos by an army mutiny.

The United Nations (UN) sent in a large peacekeeping force, *Organisation des Nations Unies au Congo* (ONUC), to prevent the superpowers from becoming directly involved. Comprising thousands of ground troops, ONUC also provided a sizeable air component to support the troops with transport and liaison services inland. The organisation operated at the invitation of the Congolese government but was not under direct Congolese control.

Problems quickly surfaced, including a constitutional crisis and the attempted secession of various parts of the country. The most serious of these involved Katanga province, the source of much of Congo's mineral wealth. Katanga was for a time supported by interests in Belgium, and to some extent France and Great Britain, and managed to build up a respectable military force, including a fledgling air force, the Avikat.

During 1961–62 the "Congo Crisis", which would continue until 1967, was largely centred on Katanga, and ONUC's military efforts were increasingly directed against halting the Katangese secession, which was finally accomplished in early 1963. Gradually reduced in strength, ONUC was finally withdrawn in mid-1964, just as a new extensive rebellion was spreading in Congo. But that is another story.

When ONUC got embroiled in the first round

JAAK ALTROV

ABOVE ***Colonel Sven Lampell was appointed ONUC's Chief Fighter Operations Officer with the arrival of F 22 in Congo in 1961. Lampell later went on to participate in Red Cross operations in Biafra during 1968–69 and Bangladesh during 1971–72.***

BELOW ***The men and machines of the UN's 22 Fighter Sqn on parade at N'djili Airport in Léopoldville (now Kinshasa) after the arrival of F 22 on October 4, 1961. Nearest the camera is the unit's first commander, Lt-Col Sven-Erik Everståhl.***

of fighting with Katanga in September 1961, it — and the world — was in for an unpleasant surprise. The Avikat immediately deployed its single "combat aircraft", a Fouga Magister armed with two light machine-guns and two locally made bombs.

For a few days the "Fouga" (as it was known) and its Belgian crew reigned supreme, attacking numerous targets and destroying three transport aircraft on the ground. United Nations air transport in Katanga all but ceased and ONUC troop columns were mauled. It was a stark reminder of the importance of air supremacy.

A CALL FOR FIGHTERS

At this point ONUC had nothing to counter the Fouga — no armed aircraft and no anti-aircraft guns. The UN immediately set about obtaining jet fighters for ONUC and requested that Ethiopia, India and Sweden each send a contingent. The Imperial Ethiopian Air Force's No 1 Sqn despatched four North American F-86Fs, while the Indian Air Force's No 5 Sqn sent six English Electric Canberra B(I).58s. These arrived in late September and mid-October 1961 respectively, by which time a truce had come into effect between ONUC and Katanga. Both units initially used N'djili airport in the Congolese capital Léopoldville (now Kinshasa) as their main base.

The official request to Sweden for fighter jets was sent on September 22 and approved by the Swedish government the same day. It was decided to send a flight of four aircraft plus a spare. The type chosen was the Saab J 29B Tunnan, or "Flying Barrel", which, while still reasonably modern, was by this time surplus to *Flygvapnet* (Royal Swedish Air Force) front-line

LENNART SOLLENBERG

HANS NORDBERG

ABOVE ***Possibly taken from a Swedish Curtiss C-46, this photograph shows four of the original Tunnans of F 22 in formation over terrain typical of southern Congo. For the African deployment the unit initially retained the type's standard bare-metal scheme but replaced the Flygvapnet roundels with a white square bearing the letters "UN".***

requirements. The type had also seen service as a ground-attack aircraft, designated A 29B, and the J 29Bs could be fitted with a variety of air-to-ground and air-to-air rockets.

The new unit, designated F 22 by Flygvapnet (22 being the first unused number in the Wing numbering sequence), was formed at Wing F 8 at Barkarby, near Stockholm. Its first commander was Lt-Col Sven-Erik Everståhl and the unit was quickly staffed with volunteers from active and reserve duty, including five pilots and a 23-man groundcrew. After a week of around-the-clock preparations the five J 29Bs left Sweden on September 30. The aircraft carried individual code letters in white on their fins, probably the same codes they had carried while with the Wing F 8 HQ Flight. The groundcrew and support equipment were transported in two USAF Lockheed C-130As. There were stops in Germany, Italy, Greece, Libya, Egypt, Sudan, Ethiopia, Uganda and Stanleyville in northern Congo before the unit arrived at N'djili on October 4, 1961, reporting in as ready for immediate deployment.

All UN fighter units were given squadron designations based on their original numbers, the Swedish unit becoming known as 22 Fighter Sqn within ONUC while still being referred to as F 22 by the Swedes; the two designations may be considered interchangeable. The three squadrons were placed under a Chief Fighter Operations Officer — Swedish Col Sven Lampell — who reported to the Air Commander of the UN Air Division. The manpower resources at the HQ were limited, however, and each squadron commander had considerable autonomy during day-to-day air operations. Two Air Contact Teams were also created for forward air control (FAC) on the ground.

A QUIET START

The ceasefire agreement with Katanga prevented ONUC from basing any new forces in the province and the closest suitable airfield was at Luluabourg, some 150 miles (240km) from the Katangese border. The Swedish unit deployed there on October 8 while the Ethiopian F-86s and Indian Canberras stayed at N'djili. Luluaborg was the capital of Kasai Province and had a 6,600ft (2,000m) paved runway; quite enough for the J 29B as long as the take-off weight was kept below maximum. There was a small maintenance hangar at the airfield but most of the time the aircraft were kept outdoors.

The first weeks at Luluabourg were quiet. Standing orders for the fighters were soon received from ONUC HQ, detailing that the J 29s would be used for air-to-air combat, together with the F-86s. The J 29s would also be responsible for close air-support for ONUC

Down among the treetops — this remarkable photograph shows how low the Tunnans of F 22 operated over the Katangese bush. One of the unit's J 29Bs hit a tree with one of its wing-mounted droptanks, which burst into flames before being promptly jettisoned by the pilot.
PER EKSTRÖM

ground units, while the Canberras would handle reconnaissance duties. All three jet units would take part in attacks on airfields, bridges and other ground targets as required. In early October the J 29s made several patrols over the Kasai/Katanga border area, where fighting had broken out between Congolese and Katangese troops. The Avikat supported Katangese ground operations with some de Havilland Dove bombing raids, but these were never encountered by the ONUC air patrols.

On November 11 the Italian crews of two ONUC Fairchild C-119s were taken captive by Congolese soldiers in Kindu, some 310 miles (500km) north-east of Luluabourg. They were executed immediately but ONUC initially believed they had been taken prisoner. Lampell flew over Kindu in a J 29 two days later but bad weather made it impossible to see anything. At this point several Canberras were also moved up to Luluabourg. The UN gave the Congolese an ultimatum to release the (presumed) captives, otherwise two pairs of aircraft from Nos 22 and 5 Sqns would attack the Congolese Army barracks and HQ in Kindu with rockets. The attack was ordered on the afternoon of November 15, but was called off just as the aircraft were being started up. The whole incident caused much bad blood between Congo and the UN.

INTO COMBAT

In late November ONUC introduced a common system of callsigns for the fighters. Under this system, 22 Sqn's callsign initially became *Tusker*, which was somewhat confusing as the Indian Air Force's No 5 Sqn was nicknamed "The Tuskers" back home. Each pilot was also given a personal callsign number, e.g. *Tusker 14* for the CO of F 22. Shortly afterwards 22 Sqn received the callsign *Cobra* instead, which in turn changed to *Chitchat* before long. Later still, callsigns *Viking* and *Firefly* were also used.

By early December 1961 the ceasefire had come under increasing strain, with many incidents in the Katangese capital Elisabethville (now Lubumbashi). On December 5 the UN in New York gave orders for ONUC to initiate a limited offensive, Operation *Unokat*, on the following day, to secure freedom of movement for its troops. By this time ONUC had acquired air superiority but the Avikat had about a dozen aircraft on strength, including the Magister.

The Avikat main base was at Kolwezi and one of the first tasks for the ONUC fighters was to destroy the Avikat's assets on the ground at Kolwezi and the smaller field at Jadotville (now Likasi) at first light. This mission was given to 22 Fighter Sqn while the Indian Canberras were to attack Katangese troop movements. Since the terms of the ceasefire were obviously void, all aircraft were to land at Kamina in Katanga after having attacked their targets.

On the morning of December 6 no targets were found at Jadotville and the first attack on Kolwezi failed owing to bad weather. The Indian Canberras attacked Kolwezi later in the morning and destroyed most of the aircraft there, contrary to orders for them to attack elsewhere in Katanga. The Avikat was virtually wiped out. Two J 29s struck Kolwezi in the afternoon,

"THE LAST ATTACK CAME SHORTLY BEFORE NIGHTFALL, AN INFERNO OF FLYING LEAD, SCREAMING SHELLS, EXPLOSIONS AND BILLOWING SMOKE. THE KATANGESE DIDN'T EVEN ATTEMPT TO FIRE AT THE JETS . . ."

BELOW ***The pilots of F 22's unofficial display team get the wheels up quick-smart during a formation take-off from Kamina in 1962. When British test pilot Robert Moore made the type's first flight in 1948 he described it as "an ugly duckling on the ground — but in the air a swift!"*** BO NILBERT

strafing the hangars, tower and fuel dump and damaging a Sikorsky H-19D helicopter. The two aircraft fired more than 1,000 rounds of 20mm ammunition and 14 rockets. In his memoirs, South African mercenary pilot Jerry Puren described the attack as being "by a flight of Saabs, immaculately piloted by the Swedes.

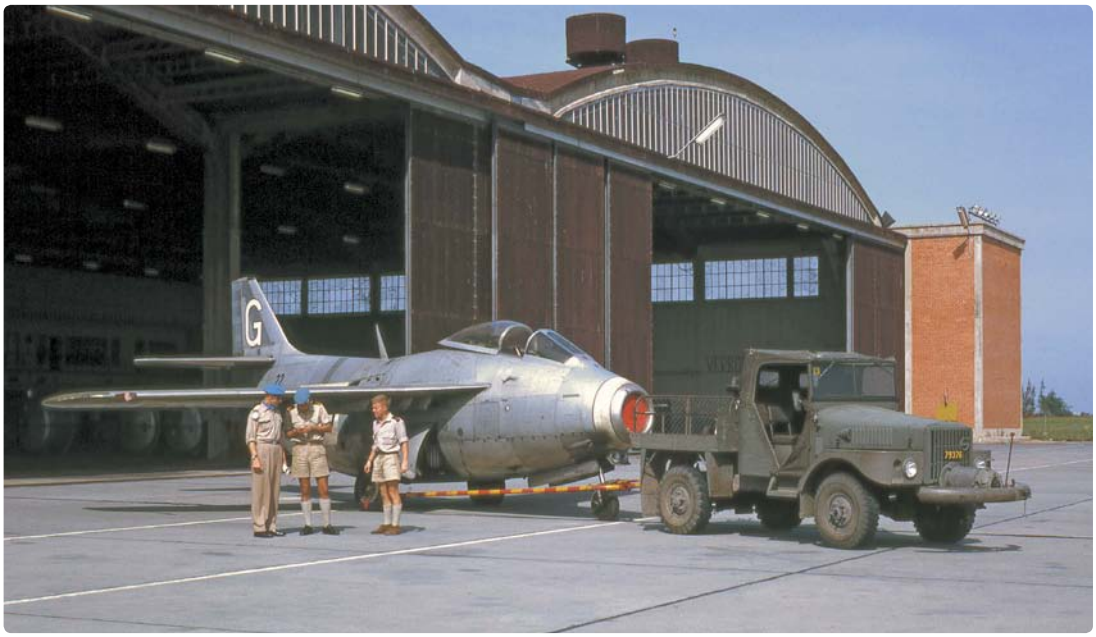
"The last attack came shortly before nightfall. It was the most vicious of all; an inferno of flying lead, screaming shells, explosions and billowing smoke. For the first time that day the Katangese gunners didn't even attempt to fire at the jets. We just kept our heads down and prayed."

In fact both J 29s were hit by bullets and one of them took five days to repair. The hits were attributed to flawed tactics — too low and too slow — and the unit adjusted accordingly, suffering no more groundfire hits during the December fighting.

The Swedish unit had brought two types of rockets to the Congo; m/51 high-explosive rockets of 15cm diameter and 7·5cm m/55 fighter rockets. The latter was actually an air-to-air weapon with limited explosive power, but tests had shown that it was also effective against ground targets, owing to its flat trajectory. With 15cm rockets it was possible to hit a house-sized target, but with 7·5cm rockets the pilots could consistently hit a target the size of a car from 1,000m (3,300ft). In Congo the J 29s never carried more than one rocket per pylon — eight in all — while on combat missions.

A MOVE TO KAMINA

Both Nos 5 and 22 Fighter Sqns now moved to the large Kamina airbase in Katanga, built by the Belgians in the 1950s and used as a military flying school. The base complex was huge and included an army base. Kamina sported two parallel runways, each 2,700m (8,900ft) long, and



EINAR GARNES

ABOVE ***Two J 29Bs were designated "White G" by F 22 during the unit's African sojourn; the first was lost in March 1962 during a landing accident and the second, Fv 29364, which arrived in December that year and was never camouflaged, is seen here at Kamina being towed out by a Volvo Startbil 954 in 1963 to be destroyed.***

had capacious hangars and other facilities comparable to any large air base in Europe. It was situated on a plateau more than 3,500ft (1,070m) above sea level, and the climate was better than in most of the rest of the country.

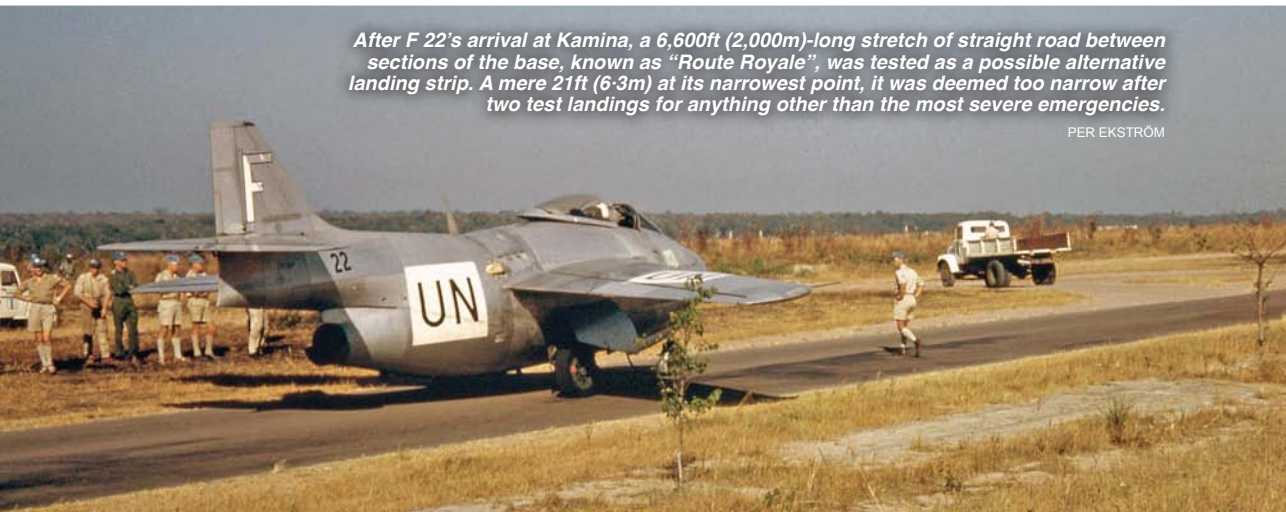
During the afternoon of December 6, F 22 also flew its first mission against the Katangese capital Elisabethville. No targets were assigned but the mere presence of the jets did much to improve morale among ONUC troops. Over the next couple of days additional attacks were made against an ammunition dump, a bridge and some suspected anti-aircraft positions. After this, the (largely symbolic) stock of 20mm ammunition that F 22 had brought to Congo was virtually exhausted. Luckily the Indians had brought plenty for their Canberras, which had the same type of gun as the J 29, and could lend the Swedes a sizeable quantity until replenishments arrived from Sweden.

Co-operating with the Air Contact Teams (ACTs) presented a challenge, since radio contact was often poor and the English spoken by the Indians manning the ACTs was hard to follow for the Swedes. The target-assignment procedure was poor too, as Lt Hans Nordberg — *Cobra 18* — discovered on December 8:

"I was to have contact with the ACT team and he was very bad at English; it was very hard to hear. You had about five minutes to find the target and drop the whole load [before fuel became critical]. The ACT began. 'Please take green house with red roof'. The whole damned city of Elisabethville lay before me! 'Exactly which house?' 'Green house, red roof!'" Luckily a Swedish officer nearby was able to add the

After F 22's arrival at Kamina, a 6,600ft (2,000m)-long stretch of straight road between sections of the base, known as "Route Royale", was tested as a possible alternative landing strip. A mere 21ft (6·3m) at its narrowest point, it was deemed too narrow after two test landings for anything other than the most severe emergencies.

PER EKSTRÖM



F 22 ARCHIVE VIA AUTHOR

ABOVE ***J 29B Tunnan Fv 29475/"White J", captured by the forward-facing camera of one of the two S 29C photo-reconnaissance variants sent to Congo in November 1962. The bright African light contrasted starkly with the northern European low-light conditions in which the S 29Cs usually operated, resulting in super-sharp images.***

rather useful information that the target was the radio station, which was duly hit.

The same day F 22 also began supporting the ONUC garrison in Manono, which was being attacked by the Katangese. Large white crosses painted on Katangese military vehicles proved extremely helpful in identifying targets. Several strikes were made over the next couple of days until the attack on the garrison was abandoned.

On December 10 the main Katangese army barracks in Elisabethville, Camp Massart, was attacked by two J 29s. There was about ⅛ths of cloud cover and from the ground the strike was quite spectacular, as later described to the pilots by ground troops: "All of a sudden two aircraft appeared and — BAM! — fired before disappearing up into the clouds again".

A strike on the Katangese military installations at Shinkolobwe, near Jadotville, by three J 29s on December 12 unfortunately hit a hospital by mistake, killing three people and seriously wounding 14. This highlighted the general problem with poor or non-existent target intelligence. There were no target photographs, only verbal descriptions, and what maps there were of the target locations were either hand-drawn sketches or copied from old travel guides. Katangese propaganda claimed that the attack was a deliberate part of the UN "terror campaign" against Katanga.

The same day several attacks were made against trains and railway yards in which, in total, 13 locomotives were destroyed or damaged by the J 29s. For moving trains, the tactic was to encourage the driver to stop, both to save lives and to make the target easier to hit:

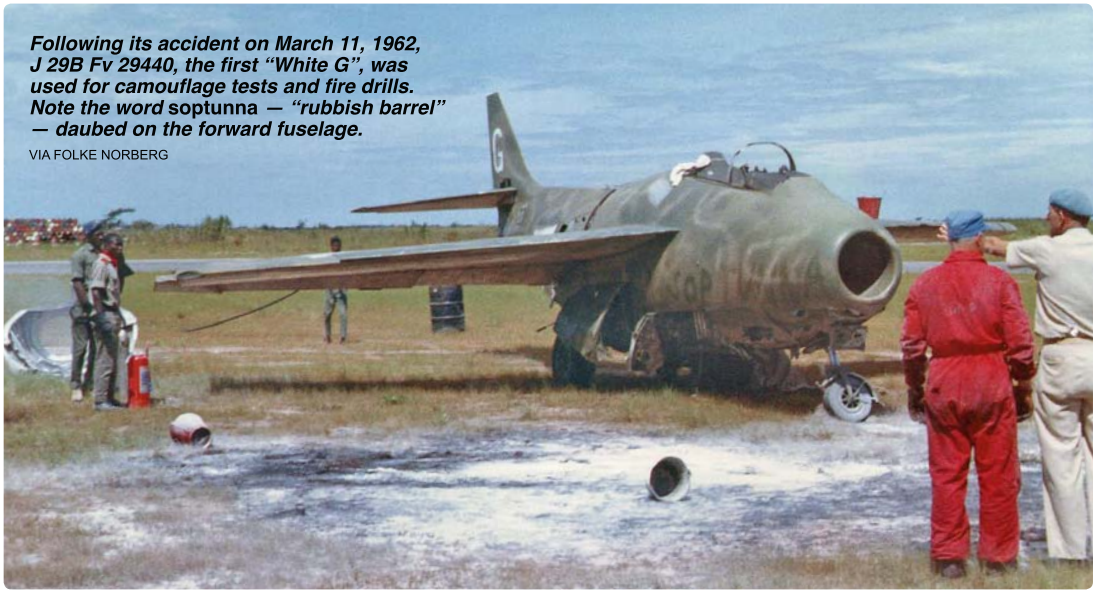
"We saw the train from a distance", Maj Harry Nanneson recalled. "We then dived towards it at around 1,000km/h [620 m.p.h.]. And when we got to within a few hundred metres of the locomotive, we deployed the divebrakes. There was a terrible racket when deploying the brakes at that speed. So even if the driver was going at full throttle the sound cut through and he would hear it. So then he stopped and jumped off."

The attack would be started at 1,000m, firing for about 2sec, by which time the jets would have covered almost half the distance to the target. Returning from one of these missions on December 12, Maj Nanneson happened upon a camouflaged de Havilland Dove, KAT-11, at N'gule airfield, between Kolwezi and Jadotville. On his second strafing run the aircraft blew up; most likely it had been loaded with bombs for a mission planned for that night.

ANOTHER CEASEFIRE

Attacks against ground targets in Elisabethville continued until December 18, after which a new ceasefire came into effect. During 12 days, 22 Fighter Sqn had flown a total of 70 combat missions, firing 127 rockets (all of which exploded on contact with their targets) and 17,027 rounds of 20mm ammunition.

There was now a period of calm, with 22 Fighter Sqn remaining at Kamina. Indian Wg Cdr Anthony Suares, CO of 5 Sqn, was checked out in a J 29B, flying four sorties in February



Following its accident on March 11, 1962, J 29B Fv 29440, the first "White G", was used for camouflage tests and fire drills. Note the word* soptunna *— "rubbish barrel" — daubed on the forward fuselage.
VIA FOLKE NORBERG

1962. Later that month a pair of J 29s was based at Albertville (now Kalemie) to escort ONUC transport flights in the area. The runway was 5,700ft (1,750m) long, marginal considering the base's elevation of 2,600ft (790m) and the heat, and the J 29's droptanks had to be removed for safety. But the deployment was cancelled after only a couple of days for political reasons. The airport was used briefly as a J 29 base again in November 1962.

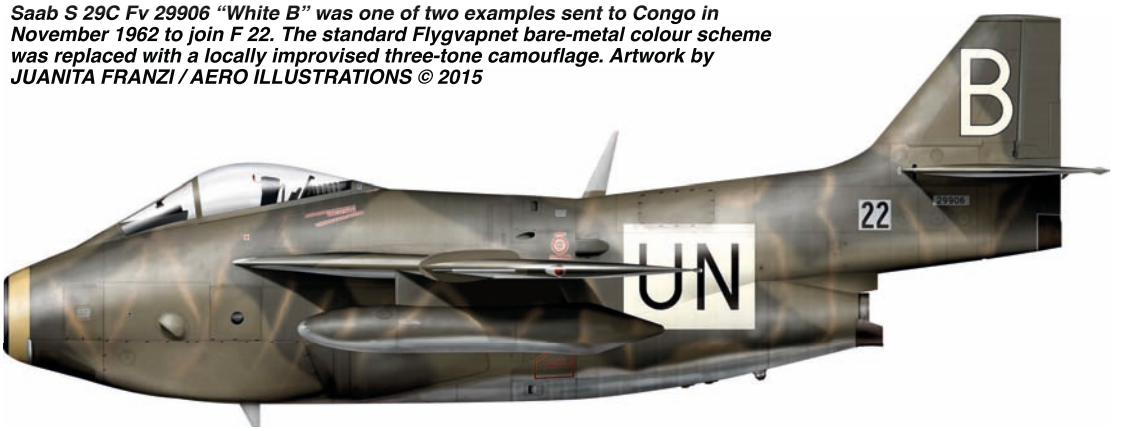
New personnel took over during March, under the command of Maj Lars-Olov Hansson, this being relieved by a third group under Lt-Col Bengt Flodén in August 1962. Flying was greatly restricted during this period, mainly owing to the high cost of fuel, which had to be airlifted to Kamina in barrels — the cost to the UN was some 60 times higher than in Europe. Some patrols and escort missions were flown but there were no offensive operations. However, on March 5 a J 29 was hit by a rifle bullet near Kamina — a bullet that by pure bad luck hit a 20mm round which exploded inside the nose. The damage was luckily not too extensive and the aircraft was soon repaired.

On March 11 F 22 lost an aircraft when Maj-Gen Lennart Peyron crashed "White G" while on an inspection tour of the Congo. He and Lampell were on a local flight when the weather closed in. While attempting a go-around after an unsuccessful first landing attempt, Peyron mistakenly retracted the flaps instead of the undercarriage. The J 29 sank and hit the ground hard. Peyron survived but the aircraft was too badly damaged to be repaired locally.

MORE TUNNANS ARRIVE

The December 1961 fighting had demonstrated the need for better reconnaissance provision. On September 20, 1962, after much deliberation, the UN sent Sweden a formal request for two S 29C Tunnan reconnaissance variants and a photo-interpretation unit. The S 29s arrived dismantled aboard USAF Douglas C-133 transports in early November. Initially, no dedicated reconnaissance pilots were provided and instead three fighter

Saab S 29C Fv 29906 "White B" was one of two examples sent to Congo in November 1962 to join F 22. The standard Flygvapnet bare-metal colour scheme was replaced with a locally improvised three-tone camouflage. Artwork by JUANITA FRANZI / AERO ILLUSTRATIONS © 2015



SAAB J 29B TUNNAN DATA

Powerplant 1 x 5,000lb-thrust SFA RM 2 (licence-built de Havilland Ghost) turbojet engine

Dimensions		
Span	11m	(36ft 1in)
Length	10·23m	(33ft 7in)
Height	3·75m	(12ft 4in)
Wing area	24m²	(258ft²)
Weights		
Empty	4,640kg	(10,230lb)
Loaded	7,520kg	(16,580lb)
Max take-off	8,170kg	(18,010lb)
Performance		
Maximum speed	1,035km/h	(645 m.p.h.)
Cruise	800km/h	(497 m.p.h.)
Climb to 10,000m (33,000ft)	8½min	
Service ceiling	13,700m	(44,950ft)
Normal range	2,700km	(1,680 miles)

ABOVE ***The first attack on Kolwezi airfield as part of Operation* Grand Slam *on December 29, 1962, met with spirited small-arms fire from the ground. Worst hit was the leader of the six-aircraft group, Maj Olof Lindström flying J 29B Fv 29374, "White D", which was hit by a bullet which passed through the front of his canopy from side to side, missing his face by inches, leaving a pair of sizeable holes, as seen above.*** STAFFAN HÅKANSON

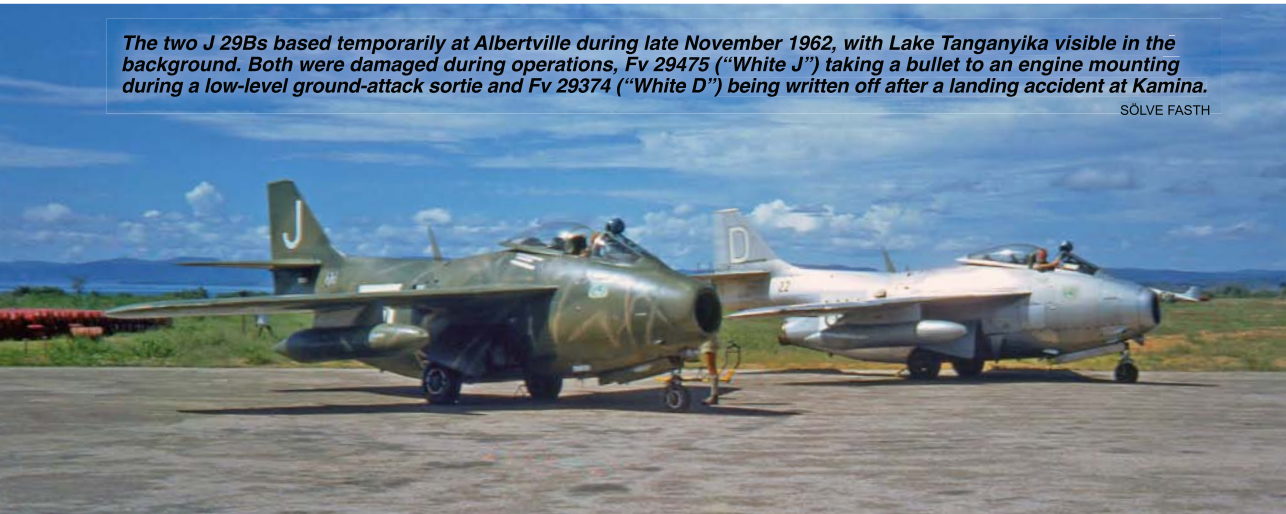
pilots were given a quick course on the S 29C, similar to the J 29B except for the camera nose.

From mid-November the S 29Cs began the extensive photo-mapping of all Katangese airfields and other likely targets. By this time, Katanga had begun rebuilding the Avikat and had received ten North American T-6s and two de Havilland Vampire Trainers, plus various supporting aircraft. As a precaution, aircraft pens were constructed at Kamina and the original J 29s and the S 29s — all marked "UN" — were put into camouflage locally during the second half of November.

There had also been discussions in mid-1962 about providing additional fighters for F 22. The delivery of four or even eight J 29Fs with afterburners was considered, in which case any remaining J 29Bs would be relegated to ground-attack duties only. The situation became more urgent after the Ethiopians pulled out their F-86s in October. The Indians were also preparing to return their Canberras to India, owing to recent border tensions with China *[see* Exercise Shiksha *in TAH8 — Ed]*. The Swedish government finally approved sending four more fighters — J 29Bs rather than J 29Fs — on November 22, which were also airlifted by the USAF, arriving in mid-December 1962. These J 29s were not put into camouflage but remained in a natural-metal finish. Unlike the earlier aircraft, they were marked "ONU" after the French abbreviation for the United Nations.

On Christmas Eve 1962 renewed skirmishing broke out in Elisabethville, and a few days later the UN decided to take the offensive against Katanga once more. By now 22 Sqn was the only fighter unit remaining but was seen as unreliable by some at UN headquarters after the Swedes had refused to comply with an order issued in November to shoot down any Katangese aircraft encountered in the air, regardless of type and/or activity. The order was eventually rescinded by the UN but F 22's attitude was resented by many and contributed to the decision by ONUC's Air Commander, the Indian Air Force's Air Cdre J.C. Varma, to resign. Vigorous UN attempts were

The two J 29Bs based temporarily at Albertville during late November 1962, with Lake Tanganyika visible in the background. Both were damaged during operations, Fv 29475 ("White J") taking a bullet to an engine mounting during a low-level ground-attack sortie and Fv 29374 ("White D") being written off after a landing accident at Kamina. SÖLVE FASTH



Mad dogs and Swedishmen — F 22 groundcrew share the limited shade of S 29C Fv 29944's wing at Kamina in early 1963. The unarmed S 29C variant (S for* Spaning *— reconnaissance) made its first flight in June 1953, deliveries to Flygvapnet beginning in the spring of 1954. PER BJÖRK

therefore made to obtain additional fighters from other countries, but yielded no results.

A new ONUC initiative, Operation *Grand Slam,* commenced on December 29, 1962, one of the first actions of which was to attack the airfield at Kolwezi. However, the Avikat had been provided with a few hours' advance warning from its spies in Elisabethville and most of the airworthy aircraft had escaped to Angola very early that morning.

Six J 29Bs took off from Kamina at 0600hr but found low cloud over the target. As they searched for a hole through which to let down, they suddenly came head-to-head with a Katangese T-6 that had just taken off. Captain Åke Christiansson in "White E" barely had time to switch his sight from rockets to guns and fire a burst. He recalls:

"I started firing at 600–700m [2,000–2,300ft] and stopped firing at 200m [650ft]. I didn't have time to reflect that there was a man in that 'crate' but only that it had to go down. It all went incredibly fast and we weren't high up. I can see the crate turning over on its side and a cloud of fragments coming off it. I was 100 per cent sure that I had shot him down."

But when the formation turned to survey the wreckage, there was no trace of the T-6 on the ground. Its pilot, Polish RAF veteran Stefan Wójcik, had managed to escape into the clouds and land his damaged T-6, KA-25, at Jadotville, where it was later captured by ONUC forces.

The J 29s then proceeded to shoot up the airfield with their guns for 22min. "We flew alarmingly low", Capt Christiansson reported. "There was no question of firing the rockets — they would have bounced up towards us." The cloudbase varied between 50m and 100m (165–330ft) and strikes were made down to 10m (30ft) altitude. Four of the six aircraft were hit by

SAAB J 29B & S 29C TUNNANS USED BY F 22 IN CONGO, 1961–63

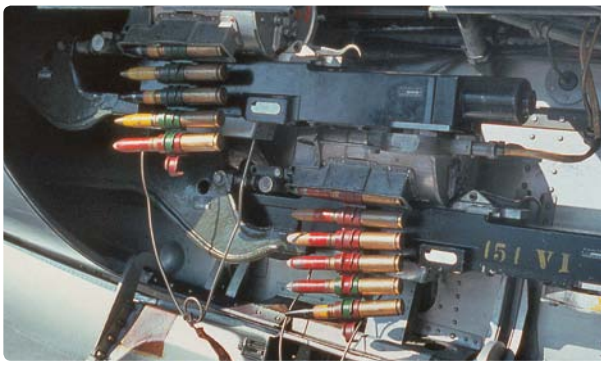
Saab J 29B

Fv 29364 Coded "White G" (second use) on F 22 strength 23.12.62 to 19.8.63. Scrapped (blown up) at Kamina, September 1963
Fv 29365 "White I", on F 22 strength 31.12.62 to 19.8.63. Scrapped at Kamina, September 1963
Fv 29371 "White C", on F 22 strength 23.12.62 to 20.4.63. Returned to Sweden
Fv 29374 "White D", on F 22 strength 4.10.61 to 23.3.63, when damaged on landing at Kamina and written off. Scrapped at Kamina, September 1963
Fv 29393 "White E", on F 22 strength 4.10.61 to 19.8.63. Scrapped at Kamina, September 1963
Fv 29398 "White F", on F 22 strength 4.10.61 to 20.4.63. Returned to Sweden; currently on display at Flygvapenmuseet, Malmslätt
Fv 29440 "White G", on F 22 strength 4.10.61 to 3.3.62, when damaged on landing at Kamina and written off
Fv 29445 "White H", on F 22 strength 23.12.62 to 19.8.63. Scrapped at Kamina, September 1963
Fv 29475 "White J", on F 22 strength 4.10.61 to 19.8.63. Damage found during inspection on 10.1.63. Repairs started but not completed; scrapped at Kamina, September 1963

Saab S 29C

Fv 29906 "White B", on F 22 strength 10.11.62 to 20.4.63. Returned to Sweden
Fv 29944 "White A", on F 22 strength 10.11.62 to 20.4.63. Returned to Sweden

F 22 ARCHIVE VIA AUTHOR



KJELL MAGNUSSON

ABOVE ***The 20mm Hispano-Suiza cannon of a J 29B of F 22 loaded with a mixture of black-tipped armour-piercing rounds and high-explosive grenades.***

LEFT ***Avikat North American T-6 KA-29 photographed by a very low-level S 29C at Kolwezi on the first day of* Grand Slam *operations at the end of December 1962.***

small-arms fire but none critically.

Five more airfield strikes against Kolwezi and Jadotville were made that day. Both Katangese Vampire Trainers were destroyed during the day, together with two T-6s, a Dove and a civilian de Havilland Dragon Rapide. The following day three T-6s were destroyed. In all, 22 Sqn had fired 5,055 rounds and 86 rockets in two days.

The last two J 29s arrived at Kamina on New Year's Eve after assembly in Léopoldville. The unit's strength was now at its peak — eight J 29Bs and two S 29Cs. One of the latter flew several post-strike photo-recce missions below 30m (100ft), piloted by reconnaissance pilot Jan Norlund, who had arrived just before Christmas.

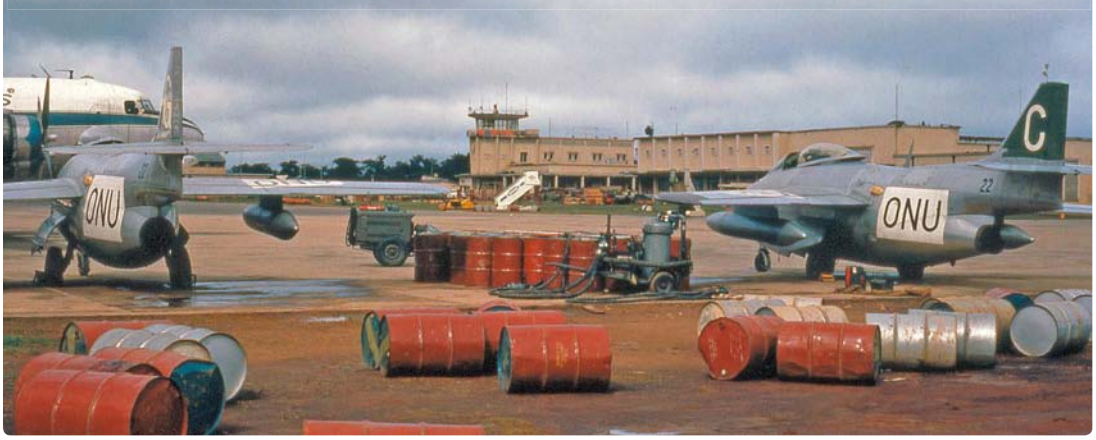
KEEPING THE PEACE

The UN offensive lasted until January 17, 1963, when Katanga's President Moïse Tshombe agreed to end the secession attempt. The Swedish unit's participation after New Year had been mainly in the form of fly-overs to intimidate the opposition. A single strike against some Katangese vehicles near Jadotville had been made on January 15 but that was all. The Swedes' aircraft serviceability rate during Operation *Grand Slam* was above 90 per cent, groundfire damage notwithstanding.

A pair of J 29s was based in Elisabethville during January 1–22, but thereafter all aircraft remained at Kamina, apart from a visit to Luluabourg by four aircraft in late March. In February 1963 a fourth and final group of personnel took over F 22, under command of Lt-Col Georg Palmquist.

For 40 days 22 Fighter Sqn had been the only ONUC fighter squadron in Congo, but during January and February, after the fighting had ended, Philippine and Iranian fighter squadrons with F-86s arrived at Kamina. A UN Fighter

In January 1963 a pair of J 29Bs was based at the Katangese capital Elisabethville to provide protection for UN air transport operations in the area. The two Tunnans, Fv 29364 and Fv 29371, were from the final wave of four fighters sent in December 1962, all of which retained a bare-metal colour scheme and bore "ONU" markings.



SVEN LAMPELL

Wing was formally created at Kamina in January 1963 to co-ordinate the three units. It was originally commanded by Lampell and had staff from all three countries. Some aerial combat training was undertaken between the squadrons in the following months and the J 29s and their pilots often came out on top in these exercises.

The Swedish squadron suffered further aircraft attrition in the new year. After an incident on January 10, an inspection of "White J" revealed that it had been more badly damaged than originally thought during the fighting. Part of the engine mounting had been destroyed by a bullet, and the J 29 was taken out of service. On March 23, Lampell was making an instrument landing in "White D" when the engine suddenly stopped. He was too low to eject and therefore continued his landing; he ran off the runway and hit a termite hill, damaging the aircraft beyond repair. Both fuel pumps had seized; the aircraft had accidentally been fitted with an older type of pump unsuitable for the non-lubricating JP-1 fuel used in the Congo, rather than the JP-4 used back home.

OUT OF AFRICA

There were many discussions about the future of the ONUC fighter force, and it was finally decided to reduce 22 Fighter Sqn to just four J 29s as of mid-April. The two S 29Cs and two J 29Bs staged to Léopoldville and departed Congo on April 20, 1963, together with two Curtiss C-46s carrying spares, tools and groundcrew. They took a route along the west coast of Africa, arriving in Sweden on April 27.

The two S 29Cs returned to Flygvapnet service for a few more years but the J 29Bs were retired. One of them, Fv 29398, "White F", was preserved and now resides at *Flygvapenmuseet* in Malmslätt.

The draw-down left four serviceable J 29Bs at Kamina plus the damaged "White J", which it had been decided to repair despite the extensive work involved. There also remained five F-86E(M)s at Kamina, flown by Filipino and Iranian crews until those units disbanded entirely in June 1963. The six remaining Tunnan pilots flew only occasionally and it was becoming increasingly obvious that the fighters were no longer needed. Pairs of aircraft were temporarily based in Elisabethville on two occasions in late April and late June 1963 to show the flag and to undertake visual road reconnaissance near the Angolan border, to ensure that no Katangese troops in exile tried to sneak back into Katanga.

In early August 1963 the decision was taken to disband 22 Fighter Sqn and the unit's last flight was made on August 19. Most of the personnel left a week or so later while a small detachment remained behind to prepare the remaining equipment for transport. After all usable parts had been removed, the remaining J 29Bs — including "White J", which was almost ready for service again — were towed out to the Kamina target range, rigged with explosives and blown up in early September.

Final accounting showed that F 22 had flown 2,126 hours in all, at a cost per hour of 525 *kronor* (around £36 at the time), and had used ammunition to a value of 711,000 kronor (£49,000). There was little in the way of special recognition for the Swedish crews after they returned home. Operations in the Republic of Congo had, however, shown that Flygvapnet procedures and tactics of the day did work in practice, albeit with a few local adjustments, and that the J 29 was every bit as reliable and resilient as could be hoped for.

The end of the road — following the disbandment of the UN's 22 Fighter Sqn in August 1963, the remaining six J 29Bs were taken out to the Kamina firing range and destroyed with explosives. Here Swedish personnel pick through the remains of Fv 29393, "White E", after its disposal in September. ARNE LJUNGLIN

Anjos um Cinco!

Portugal's Hurricanes and the making of Angels One Five

In the summer of 1951 five Hawker Hurricanes of Portugal's *Aeronáutica Militar* arrived in the UK to star in a forthcoming film about the Battle of Britain. **JOSÉ MATOS** chronicles the Hurricane's career in Portuguese service and how, thanks to Portugal's abiding faith in the pre-war-vintage fighter, it went on to play a memorable role in a classic 1950s British war film

MAIN PICTURE ***Charm school — Alferes (2nd Lt) Pereira Lemos of the* Aeronáutica Militar *gives Rank Organisation starlet Patricia Dainton a tour of his "office" at the Hawker factory at Langley in July 1951. Miss Dainton did not appear in* Angels One Five, *but was apparently a guest of one of the film's co-producers.***

TAH ARCHIVE

LOBO FERNANDES COLLECTION

IN THE DECADE following the end of the Second World War several films portraying the Battle of Britain were produced, one of the central aims being to recreate some of the remarkable episodes of the epic opening salvo of Britain's war against Nazi Germany. One of the most famous of these films was the Associated British Picture Corporation's *Angels One Five*, directed by George More O'Ferrall, Britain's first ever television drama director and producer and — significantly for the film — the Army's Liaison Officer at Fighter Command Headquarters during the Battle in 1940.

The film was released in the UK in March 1952 and portrayed the trials and tribulations of the operational life of a typical Hawker Hurricane squadron at an RAF base during the Battle of Britain. A problem for the production company, Templar Productions, however, was the lack of airworthy Hurricanes that could be used for filming. The last front-line RAF examples had been retired from operational service in early 1947. There were only two flying examples left in Britain: Hurricane IIC PZ865/G-AMAU *The Last of the Many*, which Gp Capt Peter Townsend

TOP ***Air Vice-Marshal The Earl of Bandon shakes hands with Alferes Moura Pinto, the flight commander of the five Portuguese Hurricanes recruited for filming, upon the group's arrival at Tangmere on July 16, 1951.***

CONCEIÇAO E SILVA VIA AUTHOR

Local aviation enthusiast Conceiçao e Silva poses in the cockpit of Hurricane IIC "580" at Sintra, near Lisbon. Referred to by the Portuguese as Mk IIBs or Mk IICs, at least 20 of the AM's wartime Hurricane deliveries were Canadian-built machine-gun-equipped Mk Xs and XIs or cannon-armed Mk XIIs.

flew as Princess Margaret's entry in the King's Cup Air Race in the early 1950s *[for the full story of G-AMAU's "blue-and-gold" years see* TAH5 *— Ed]* and IIC LF363, still on strength with the RAF.

Portugal , however, continued to fly the type in operational service; and, to remedy the shortage of airworthy aircraft, the producers recruited five Portuguese examples for use in the film, which at that point had the working title *Hawks in the Sun*, after the book by Wg Cdr A.J.C. Pelham Groom, on which the film was to be based.

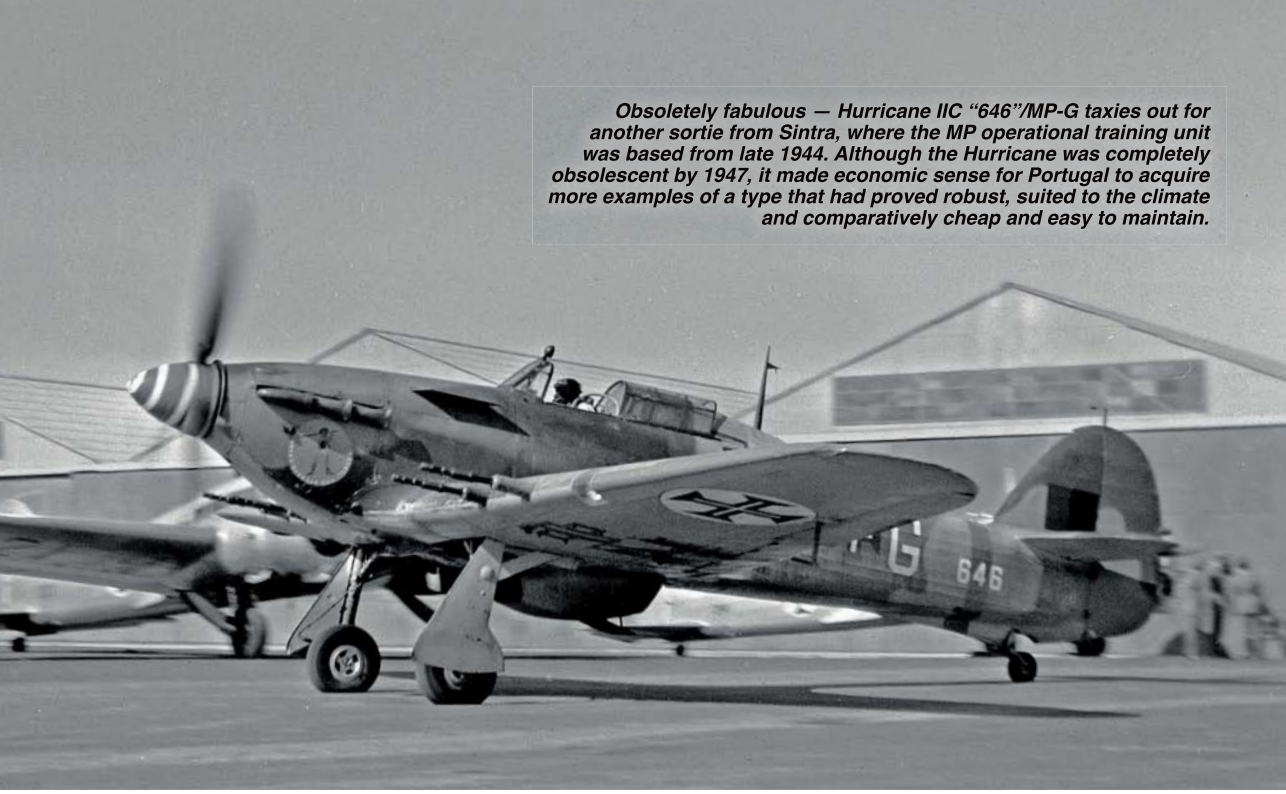
O FURACAO

The first six Hurricane IICs delivered to Portugal, all former RAF aircraft, arrived from Libya, via Gibraltar, at Ota Air Base, 30 miles (50km) from Lisbon, on Saturday, August 7, 1943. Portuguese *Cruzes de Cristo* (Crosses of Christ) had been applied at Gibraltar en route. The following Monday morning the newly-arrived Hurricanes were put to work on conversion training for *Aeronáutica Militar* (AM) pilots, the RAF ferry pilots (including Dave Jackson and Bill Tye) providing the necessary instruction. Initially retaining the last three digits of their RAF serials — 354, 358, 459, 488, 840 and 964 — these six aircraft were given the Portuguese serial numbers 540–545 at the end of August, when the first AM Hurricane squadron, designated VX, was formed under the command of *Capitão* Machado de Barros. The aircraft were coded VX-A to VX-F.

Meanwhile more Hurricanes were on their way via transport ship from the UK as part of Operation *Oatmeal*, the convoy arriving at Lisbon on August 29, 1943. Of the 55 Hurricanes delivered, some 31 were machine-gun-equipped Mk IIBs, the remainder being IICs fitted with 20mm cannon. These were to be divided between VX and three newly-formed fighter units coded SU, TY and RV. All were based at Ota except RV, which was based at Sintra under the command of Capt Brilhante Paiva. Another 18 Hurricanes arrived by sea in September—December 1943 to bring each Hurricane unit up to full operational strength of 15 aircraft and replace losses. In January 1944 another 18 Hurricanes were loaded aboard merchant ships and departed the UK for Portugal, making a total of 97 Hurricanes delivered to Portugal within six months. With the arrival of this last batch another Hurricane unit, GL, was formed under the command of Capt Rodrigues Frutuoso at Ota, later moving to Tancos in central Portugal.

Two of the Hurricane units, VX and SU, were equipped entirely with cannon-armed IICs, the remaining squadrons retaining their IIBs fitted with 12 x 0·303in machine-guns. Many of the examples delivered in late 1943 and early 1944 were also fitted with underwing racks for 250lb and 500lb bombs.

By the end of April 1944 Ota had become overcrowded and it was decided to relocate the Hurricane units to other bases, Ota retaining its complement of Supermarine Spitfires and Bell P-39 Airacobras. On May 1, 1944, the SU and TY units were transferred to Tancos, with GL and VX squadrons relocating to Portela de Sacavém, near Lisbon, for the defence of the capital. The RV unit,



Obsoletely fabulous — Hurricane IIC "646"/MP-G taxies out for another sortie from Sintra, where the MP operational training unit was based from late 1944. Although the Hurricane was completely obsolescent by 1947, it made economic sense for Portugal to acquire more examples of a type that had proved robust, suited to the climate and comparatively cheap and easy to maintain.

CONCEIÇAO E SILVA VIA AUTHOR

based at Sintra, moved on to Espinho to perform similar defence duties for Oporto. While Portugal remained neutral throughout the war, regular air-defence training sorties, based on techniques developed by the RAF, were undertaken.

May 2, 1944, saw the first fatal loss of an AM Hurricane when *Primeiro Sargento* (First Sergeant) Jaime Pinto Bastos suffered from carbon-monoxide poisoning and crashed near Cartaxo while on a patrol. Four days later the AM's Hurricanes participated in the first public presentation of Portugal's newly-acquired military equipment at Ota. During the event, various government officials and VIPs were treated to a display of formation aerobatics by the Hurricanes of VX, as well as mock bomb attacks by Miles Masters and Bristol Blenheims and the simulated destruction of a train by Spitfires.

By the end of 1944 yet another Hurricane unit had been formed at Sintra following the relocation of RV to Espinho. The new unit, MP, was equipped with Hurricanes from the other units, its role to provide operational training on the type that had become Portugal's most numerous fighter. With the war over, VX relocated in August 1946 to Tancos, where it remained until January 1, 1947, when it moved to Espinho to join RV.

TRIED AND TRUE

In 1947 Portugal made the decision to acquire more Hurricanes, having made good use of the examples it had received so far. The type was dependable and rugged and well-suited to Portugal's relatively small territorial size.

Portuguese Hurricane deliveries 1943–47

1st batch — Operation *Mildew*, August 1943
6 x Hurricane IIBs delivered from Libyan RAF stocks to Ota on 7.8.43 (AM serials 540–545)

2nd batch — Operation *Oatmeal*, August 1943
55 x Hurricane IIBs and IICs transported by six British merchant ships — *SS Ocean Angel*, *SS Empire Rhodes*, *SS Corileng*, *SS Empire Mortimer*, *SS Empire Basvial* and *SS Empire Service* — departed UK 14–16.8.43, arrived Lisbon 29.8.43

3rd batch — September—December 1943
18 x Hurricane IIBs and IICs delivered to Portugal as replacement or "wastage" aircraft

4th batch — January—February 1944
18 x Hurricane IICs transported by three British merchant ships — *SS Empire Cormorant*, *SS Dramore* and one unidentified — departed UK January 1944, all arrived by 17.2.44

*Wartime subtotal = **97** (37 x IIBs, 60 x IICs)*

1947 delivery batches (AM serials 607–651)

April	**1** x Hurricane IIB, **8** x IIC
May	**15** x Hurricane IICs
June	**4** x Hurricane IICs
July	**6** x Hurricane IICs
August	**1** x Hurricane IIC
September	**2** x Hurricane IICs
November	**1** x Hurricane IIC
December	**7** x Hurricane IICs

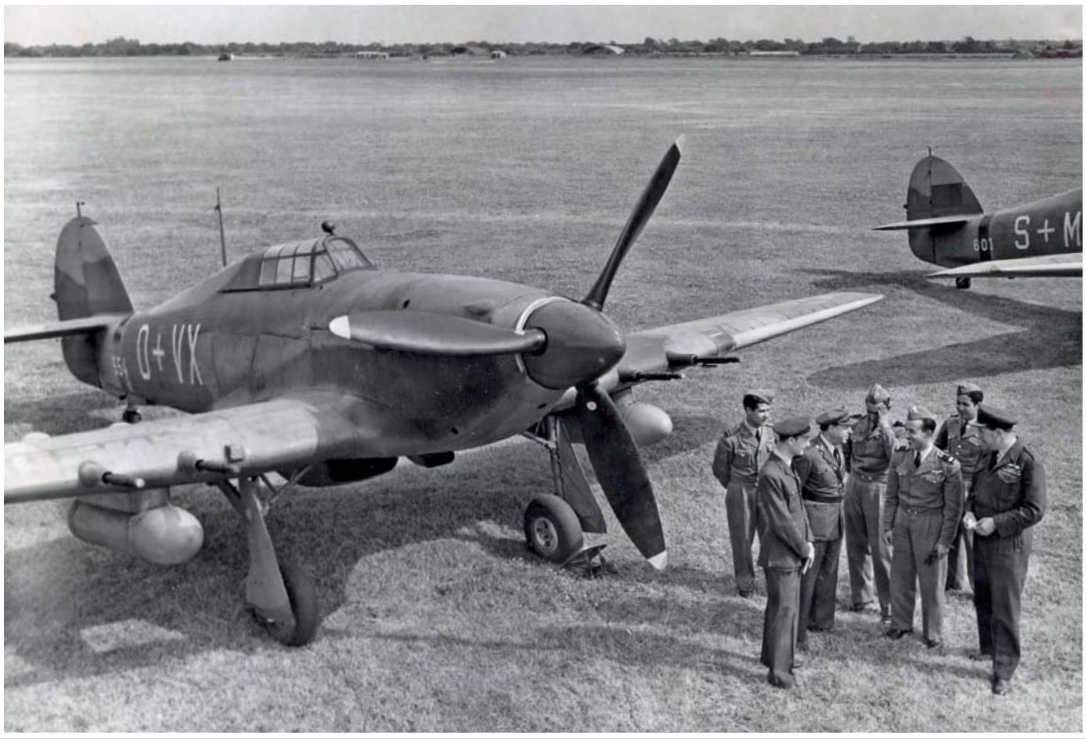
*Post-war subtotal = **45** (1 x IIB, 44 x IICs)*

GRAND TOTAL = 142 (38 x IIBs, 104 x IICs)

Flown to the UK by Alferes Lobo Fernandes, Hurricane IIC "624", bearing the code letters MP-B, was photographed at Langley before its long-range tanks and cannon were removed and its temporary RAF markings were applied for filming at Kenley.

RIGHT ***Several of the Hurricanes that arrived for the filming were adorned with a distinctive artwork of a cannon-armed fly or mosquito in pilot's helmet and goggles, above which was the legend "Ou vai ou racha" — "Sink or swim" in Portuguese; if any readers can elaborate, please contact the Editor!***

BELOW ***The Portuguese pilots chat with RAF officers Wg Cdr T.B. "Barney" Beresford (second left), who was involved in the filming, and Gp Capt Tom Prickett (furthest right) at Tangmere. Hurricane "554"/VX-O was one of two in the group from VX, the other being "544"/VX-E. The other three were coded MP: "601" (S); "624" (B) and "600" (unknown).***



TAH ARCHIVE x 3

Hurricane IIC LF422 is prepared at Langley for delivery to Portugal in late 1946 or early 1947. This machine was one of the first post-war batch to be delivered, arriving in Portugal on April 10, 1947. The tail of Langley-built Hawker Tempest VI NX285 is just visible in the background.

TAH ARCHIVE

Accordingly orders were placed with Hawker for the supply of 44 Hurricane IICs and a single IIB (formerly LF342), which were reconditioned from a batch of 50 at Langley and re-engined with Rolls-Royce Merlin 22s. The first nine arrived in Portugal in April 1947, with 36 more following over the next eight months. These 45 aircraft were distributed to the existing Hurricane squadrons and received the Portuguese serials 607–651.

By the beginning of the 1950s many of Portugal's Hurricanes had been damaged beyond repair, lost in accidents or withdrawn from service. In 1951 the type equipped only one operational unit, the *Grupo Independente da Aviação de Caça* (GIAC — Independent Aviation Fighter Group) at Espinho, the only fighter unit in northern Portugal. The AM also kept Hurricanes at Sintra, further south near Lisbon, for training purposes.

With the GIAC comprising some 15 operational pilots and the same number of Hurricanes, it was with delight that the Portuguese pilots at Espinho received an invitation from the British Air Ministry to participate in the making of the forthcoming film about the Hurricane's "finest hour". Accordingly, five GIAC Hurricanes and the same number of pilots were selected and prepared for the flight to the UK, where filming was to take place. These were "544", flown by *Alferes* (2nd Lt) Moura Pinto (flight commander); "554" (Alferes Brochado de Miranda); "601" (Alferes Pereira Lemos); "624" (Alferes Lobo Fernandes) and "600" flown by Primeiro Sargento Calado Orvalho.

The fighters were equipped with underwing auxiliary fuel tanks for the flight to the UK and were accompanied by Avro Anson "215", piloted by GIAC commander *Major* Duarte Silva and Alferes Cruz Novo. The group left Portugal on

BELOW ***With their Hurricanes painted in vintage camouflage and bearing the "US" codes of the RAF's No 56 Sqn, four of the Portuguese pilots discuss the flying sequences at Kenley with Barney Beresford (second left) and Hawker test pilot Frank Murphy (third from right), who flew PZ865/G-AMAU (fourth Hurricane from left in line-up).***

LOBO FERNANDES COLLECTION

TAH ARCHIVE

ABOVE ***Four of the Portuguese Hurricanes and*** **The Last of The Many** ***— "US-B" — aloft during the filming of the flying sequences for*** **Angels One Five.** ***With filming wrapped by mid-August 1951 the Portuguese Hurricanes were flown back to Espinho to resume their duties with the Aeronáutica Militar's GIAC unit.***

Thursday July 12, 1951, and stopped in Spain (Logrono) and France (Tours), before finally arriving at Tangmere on July 16, where the Portuguese pilots were received by Air Vice-Marshal the Earl of Bandon, then Air Officer Commanding No 11 Group.

LIGHTS! CAMERA! ACTION!

During their first five days in England the Portuguese pilots accepted invitations to visit RAF Odiham and Fighter Command Headquarters in London, after they had flown their Hurricanes to Hawker's Langley factory to receive RAF markings for the film.

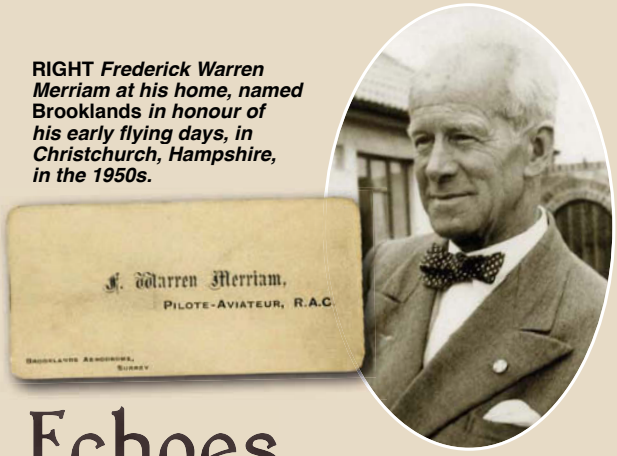
After preparations were complete, the first day of filming took place at RAF Kenley on July 20. Over the next week the Portuguese pilots made several flights with four aircraft from Kenley over the local area and the English Channel, with cameramen in the Portuguese Anson. As always with filming, there were a number of mishaps, including the collision of a Portuguese Hurricane with an audio-recording truck placed too close to the taxyway used by the fighters. The aircraft suffered severe damage but was quickly repaired by groundcrew. With filming completed the GIAC Hurricanes departed for their return to Portugal on August 17, reaching Espinho five days later.

The film was released in 1952, by which time its title had been changed to *Angels One Five* (the producers feeling that *Hawks in the Sun* was too suggestive of a movie about war in the desert), and would go on to become a British war classic.

The AM's Hurricanes continued to serve, if only for a short while longer, Portugal becoming the last nation to use the type operationally when "615" made its last flight in Portuguese service on June 5, 1954, at Sintra.

Hurricane "633"/MP-C, one of the post-war batch delivered in 1947, taxies out at Sintra. On July 1, 1952, the Army's Aeronáutica Militar and the Navy's **Aviação Naval** ***were merged to become the*** **Força Aérea Portuguesa,** ***which then set about equipping with jet-powered Republic F-84G Thunderjets.***

CONCEIÇAO E SILVA VIA AUTHOR



RIGHT ***Frederick Warren Merriam at his home, named*** **Brooklands** ***in honour of his early flying days, in Christchurch, Hampshire, in the 1950s.***

Echoes from Dawn Skies

A Lost Manuscript Rediscovered

FREDERICK WARREN MERRIAM concludes our eight-part *Echoes From Dawn Skies* series with his own recollections of the early days of British aviation's magnificent men and their flying machines

THE STORY SO FAR: Shortly before his death in 1956, aged 76, renowned pioneer pilot and flying instructor F.W. Merriam — who in 1912 was the first man to fly an aeroplane through cloud — completed a book manuscript, entitled *Echoes From Dawn Skies.* It comprised recollections of the early years of flying, gathered from his contemporaries, many of whom had by then become leading figures in the aviation world.

Seeking "to present a more personal and intimate picture than has yet been produced", Merriam had asked them each to "contribute a story of a personal nature, something that had never before been published".

The result was a treasure-trove of fresh, first-hand insights into the lives, work, unquenchable spirit and humour of these early flyers. Sadly Merriam died before the book could be published, and the priceless manuscript vanished into obscurity for more than half a century . . . until, in summer 2013, it came to the attention of *The Aviation Historian.* Merriam's granddaughter, Sylvia Macintosh, aware of the manuscript's importance and keen to see it finally in print, discovered *TAH* and got in touch with Managing Editor Mick Oakey, who immediately set the wheels in motion. As Mick says, "Reading the material today is the next best thing to teleporting back in time to share a pint or a convivial dinner with these remarkable men".

As well as gathering together the testimony of his fellow pioneers in *Echoes From Dawn Skies*, Merriam also included some of his own memories of those halcyon days, and it is to these, fittingly, that we turn for the eighth and final instalment of our series based on the recently rediscovered manuscript.

In his original preface, written in the autumn of 1956, Merriam set out his reasons for seeking out his former colleagues and acquaintances — "maniacs!" in his own words — from those exciting, challenging early days of British aviation:

"Two years ago I conceived an idea and set to work to hunt up all the survivors of those wonderful days . . . it was a tall order and admittedly my hopes were not too high. Many obstacles and disappointments assailed me; of some 'old-timers' no trace could be found, others had passed on and one or two were too tired to trouble. However, after a little gentle persuasion these eventually made the effort . . . God bless them!"

Teaching an old dog new tricks — Frederick Warren Merriam (left) and fellow aviation pioneer Harold Barnwell with furry friend in a Bristol Boxkite at Brooklands. Merriam's own caption to the photograph reads: "First bulldog to fly, 1912. Barnwell holding the dog while I piloted. It is generally known that once a bulldog digs his teeth into one it doesn't let go . . . this was in my mind and although rather restless at first he soon got used to the sensation and seemed to enjoy his novel experience".

"AIR-ITIS"

Lt-Cdr FREDERICK WARREN MERRIAM AFC FRAeS (1880-1956) ☛

LITTLE MORE THAN a century before this was written this lovely old world of ours was, comparatively speaking, a quiet, lazy and peaceful place. The countryside clean and fresh. The scent of nature was not contaminated by the smell of motor traffic. The sounds, too, had a restful, peaceful effect on the human senses. People went their way by rail, by ship and by horse-drawn conveyance. Occasionally there would be a balloon making its way silently and majestically across the sky.

So let us go back over the years and pretend we have halted the colossal roar, rattle and noise of the present mechanical age. In our imagination we hear only the pleasant "clippity-clop" of a horse's hooves, the chatter of the birds and the rustling of the trees. It is all so soothing; all so undisturbed. "Yes," you will say, "but all so slow, surely. What about progress?"

Well, progress was there all right. Just around the corner. Motoring was making a timid entry into our midst. France was already well advanced in the field. England was slower, more reluctant to accept this noisy newcomer, but nevertheless it was having a forceful influence upon a few of us. And I confess, now with some reluctance and guilt, to being one of the first to weaken to that influence. Adventure was always the ruling passion within me. I was soon helping to raise the dust on one of those new-fangled Triumph motorcycles. Then, in 1901, I had an 8 h.p. De Dion-Bouton motor car. Later there would be others.

Horse lovers and car owners of those days will remember many amusing and even pitiful incidents. Specially do I remember the hostility we car owners encountered with the London cabbies; the rude retorts and rebukes when our motors upset their horses. But the period of leisurable motoring was not too short-lived and it was certainly crammed with excitement and interest, despite the hazardous job of mending punctures. People were shy of the combustion carriage for a long while. So the proud owners of automobiles were few and far between.

Then, almost simultaneously, another menace to our future peace was threatening. Our flying pioneers were becoming active in yet another mad adventure. Maniacs! That is what we were called. And, in fact, we were truly delirious with a high fierce fever, which was known as "Metal Fever" and "Air-itis".

IN THE SWING OF THINGS

Early pilots knew only too well how dangerous and worrying the contact of a propeller could be; it was a common occurrence in those early days and the cause of many accidents was because the propellers were made from solid pieces of wood. After many complaints and warnings of the perils, these were replaced by the laminated

ALL IMAGES F.W. MERRIAM ARCHIVE UNLESS OTHERWISE STATED

OPPOSITE PAGE, LEFT ***F.W. Merriam in 1901 in his first automobile, an 8 h.p. De Dion-Bouton, which, he stated, "went up steep hills better in reverse gear".*** **ABOVE** ***Perched among copious struts and wires, Merriam poses in a Bristol Boxkite at Brooklands in 1911.*** **TOP RIGHT** ***Merriam's 1914 Royal Aero Club Competitors' Register Certificate for air-racing.***

type. My friend Arthur Lang and I were the first to experiment with the latter.

One particular incident I recall was in 1912 when I was flying a Bristol Boxkite about 50–70ft (15–20m) up, and the solid propeller broke and smashed the elevator. The result was that the fore-and-aft control would not work and I could not "flatten-out" before landing. Had it not been for a stiffish headwind I might have had a terrific crash with the engine finishing on top of me. A number of others were less fortunate. In my case, the aeroplane escaped with a smashed undercarriage and a damaged lower wing.

Propellers have been responsible for some serious accidents, not only in flight. Knowing how to swing them in order to start the engine was an important part of any pioneer's training. Many a would-be pilot and mechanic has been maimed or even killed through careless swinging or slipping into the prop. I used to lecture my pupils that it was just as important to learn how to swing a prop correctly as it was to learn how to fly correctly. I feel very happy in knowing that, of the hundreds of pupils I taught to fly, not one was injured as a result of swinging a propeller.

Bad judgment in landing was also the cause of many accidents. In connection with this I developed a technique which was later used for deck landings on aircraft carriers. I noticed at Brooklands that after a pupil had gone solo, he would sometimes get rather nervous about landing in a small area; at Brooklands we had to land in the middle of the famous racing track, so different from the wide landing ground at Larkhill on Salisbury Plain. So I adopted the idea of waving a large piece of white cloth near where I wanted the pupil to land. In time he learned the lie of the land all right, and became as confident in landing at Brooklands as anywhere else.

The nearest I came to dodging a building was very early in the game, at St Nicholas' Home for Crippled Children at West Byfleet in Surrey. Back in 1911 the children often saw me flying over in a Bristol 50 h.p. Boxkite. Then one of the nurses expressed a wish for me to land in the grounds so that the children could get an even closer look at the machine. It was a risky job to undertake but I did not want to disappoint the children. Even before my visit, they could talk of nothing else but "of an aeroplane being landed near them". So the flight was made.

The landing was made with comparative ease. Then came the take-off. To cut the weight down I left my passenger, a pupil named Pendlebury,

ABOVE ***Merriam (standing with arms crossed) and some of his early pupils with a Bristol Boxkite at Brooklands in 1911. Sitting in the pilot's seat is fellow Bristol flying school instructor Collyns Pizey, who took Merriam for his first flight. In 1913 Pizey was appointed to the British Naval Mission to Greece, where he died of dysentery in 1915.***

behind. Then I was airborne. One tree was dodged. Then another. Then a sharp-bank turn to avoid the building. And the kiddies were roaring with delight. Finally, I was clear and offering a silent prayer to the Almighty for watching over me that day.

If any of those children are alive today, they will surely remember when they were visited by their "Wonder Man of the Sky", as the Matron afterwards told me they called me. I visited the children on two or three occasions later, taking presents for them. If the home is still there it is probable that the picture of a Boxkite — a souvenir of my flight — still hangs on the wall.

LOOPS, TRICKS & PARTY PIECES

The year 1913 was epochal throughout the entire world of aviation. Heretofore, "stunt" or "trick" flying had not been contemplated. Flying was still rudimental. We went very cautiously before trying out anything unfamiliar to the ordinary. Many of the fatalities were caused, no doubt, by over-banking or stalling and too often through structural weaknesses of the machine and the absence of safety straps. We were, however, making good progress in the additional numbers of newly qualified pilots and the increasing number of hours being flown.

Fatal accidents were far too numerous and, sad to say, the tragic end of Colonel Cody [Samuel Cowdery] was one of these. His machine collapsed in the air and turned upside-down. Dear Cody and his passenger fell out, neither of them wearing a safety strap. It was said afterwards that had they been strapped in they may not have been killed, as the centre of the machine where they were sitting fell on to some trees and was undamaged.

To add a little zest to the humdrum routine of flying, as well to arrest the interest of members of the public on bank holidays and motor-race meeting days at Brooklands, we aviators would set aside tuitional and other work to entertain. There would be races, joyrides and demonstrations of the different machines. My own particular "party piece", if I may be so bold to tell, would not sound very exciting nowadays, but it went down well then. It was a highly dangerous thing to do and was acknowledged as being so. In the Boxkite I would climb to 1,000ft (300m) or more over the aerodrome. Having reached the desired altitude I switched off my petrol and engine, which could not be restarted. Then, with the propeller stopped, and pushing the nose down, I would proceed to execute a steep vertical "corkscrew" descent

to within 100ft (30m) of the ground, flatten out, then half-circle and glide, landing and stopping about 50ft from the spectators' enclosure. The silence of this performance was an attractive feature also. This was a feat of balance and judgment. I was not strapped in. My left hand was my "safety catch" as it held fast to the side of my seat, the other hand being occupied with the control stick and my feet were in use on the rudder bar. The steep angle of the machine slid me forward to the extreme edge of the seat. I never carried a passenger on these occasions — any giddiness or frustration behind me would have been fatal, even if he had been strapped in — for the least movement behind me would have been sufficient to throw me out.

Later the same year the entire world of aviation was agog with excitement at the news of Adolphe Pégoud's amazing "trick" flying. He had "looped-the-loop" in France and was acclaimed the greatest hero of all time. British aviation, however, received this astounding news with incredulity at first, and Pégoud (**INSET, TOP**) was persuaded to come over and give a demonstration. It was a great occasion for us. Louis Blériot flew over from France with M Pégoud on a specially strengthened Blériot monoplane built to stand the strain of aerobatics. Blériot, the designer and builder of this machine, personally supervised the exhibition.

Pégoud was a superb flyer. Seeing was believing and we were completely staggered by his performance of looping-the-loop, inverted flying, tailslides and the like. Aviation all over the world owes an enormous debt of gratitude to this very brave man for risking death to bring about an absolutely new conception of flying and showing us the way.

No time was lost by a number of our pilots in following his fine example. The aircraft we had then required sturdy modifications before attempting stunt flying. Meanwhile, the impatience of B.C. Hucks and one or two others could not be restrained, so over they went to Buc in France to learn more from Pégoud and bring a Blériot monoplane back. Lord Edward Grosvenor bought two of these; he and Robert Skene had qualified for their tickets at our school only about a month before they were looping-the-loop too.

Hucks, of course, was the first to do this, Gustav Hamel following a little later. Harold Barnwell, also from our school, looped on a Sopwith Tabloid fitted with an 80 h.p. Gnome engine. Hucks became a magnificent aerobatic flyer and invented the "delayed loop". Others were also adding items to their repertoires of spectacular flying. Crossing the Channel was now no longer a rarity. Hamel did this more times than anybody else.

UP-DIDDLY-UP-DUP . . .

Flying displays at Hendon and Brooklands were now becoming very popular. Although members of the public readily paid to attend or watch from outside, few braved the risk of flight. The price for such a flight was one to two guineas for a short hop — and was possibly a deterrent also.

The French constructors had found a good market for their Blériots the world over. They became increasingly popular here too. Sydney Pickles, having recovered from an accident, was back and flying again on his self-owned Blériot monoplane. Marcel Desoutter, who belonged to Hendon, ranked with some of the first to adopt a Blériot. He unfortunately had a very bad crash and wrecked his. He sustained severe injuries

Gustav Hamel making his last flight at Brooklands, in a Blériot XI monoplane. Hamel's aviation achievements were outstanding, including the first cross-Channel flight with a woman passenger, the first flight from the UK to Germany and the carriage of the first official airmail in Britain. Aged only 24 years old, Hamel went missing over the English Channel on May 23, 1914.

ABOVE ***Merriam in fez in the cockpit of one of the Bristol school's Prier monoplanes at Brooklands with a group of Turkish pupils in 1912. From left to right: instructor Sydney Pickles; pupil Fazil; an air mechanic; pupils Abdullah and Aziz; unknown; mechanic S. Summerfield; pupil Fethi; chief engineer Willis and pupils Mehmet Ali and Sahni.***

on the occasion, necessitating him to have one of his legs amputated. After being fitted with an artificial limb of a cumbersome heavy wooden kind, the standard in those days, he set about designing and making a more comfortable limb in keeping with his own technical and aeronautical principles. It was made of aluminium alloy covered with soft leather, very light in weight. The experiment was very successful and as it became known other people approached him to do the same for them. He then patented the invention and the demand for Desoutter artificial limbs became widespread. The invention was particularly timely for the injured of the 1914–18 war.

Despite his handicap Desoutter pluckily returned to flying on Lord Edward Grosvenor's Blériot. The principal machines at our disposal at this period were pusher-configured Bristol, Henry Farman, Short, Vickers and Maurice Farman biplanes, and of the tractors there were the Blériot and Deperdussin monoplanes, along with the Avro 504, B.E.2 and Caudron biplanes.

. . . DOWN-DIDDLY-OWN-DOWN

While Hendon seemed to be busy with exhibitions, coupled with some school flying, there was a noticeable quietness coming over Brooklands at the end of 1913. Roe, Sopwith and Blackburn had given up experimental flying and had settled down to constructing aircraft for others to fly. Geoffrey de Havilland was with the Aircraft Company Ltd at Farnborough and still very actively flying and designing. I had

The perils of not strapping in — Merriam (in car) and Royal Aero Club officials look on in horror at Brooklands as Sgt Dean, flying his last test for his RAeC Certificate, falls to his death from 400ft while making a steep turn.

ABOVE ***The Bristol "Sociable" — a Prier monoplane two-seater with side-by-side seating — in which Merriam was seriously injured, and his pupil George Gipps was killed, at Larkhill on January 26, 1914. According to*** **Flight,** ***after the aircraft dived into the ground, Merriam "jumped out of the machine, ran a few yards and then fell on his face".***

been so busy hitherto with tuition work and had had no opportunity to gain further experience on the newer types of Bristol aircraft, so I seized the chance given me during the lull to go to our Salisbury school, where I enjoyed a pleasant and exhilarating change from the sameness of school work. Here, I could practise on the faster and more experimental machines.

My jubilance did not last long, however, for, having earned a considerable reputation for instructing, I was sought after by the Salisbury pupils to give them lessons, and it was with one of these my first serious crash occurred.

I was giving dual instructions on a Bristol "Sociable" monoplane with a 50 h.p Gnome. The pupil was ruddering hard. I shouted to him to moderate his pressure but he could not hear me through the noise of the engine, so I shouted again and he suddenly released the rudder so abruptly that it caused me to rudder violently. We were too low to counteract the dive. I turned the petrol off as we nosed to the ground. Neither of us was strapped in or was wearing a crash helmet. The pupil was killed instantly and my own injuries have been an unhappy reminder of this sad experience to this very day.

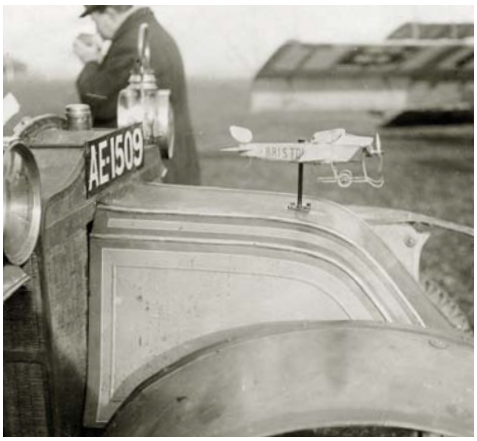
After being patched up I returned to Brooklands where Sydney Sippe and Frank Halford had been ably carrying on during my weeks of absence. The first thing I did upon returning was to get into the air again and test my reactions. I was quite at ease and very grateful to find that the pupils had not lost confidence in me.

Closely following this one early morning the official observer, myself and others, were watching a pupil finishing the last tests to qualify for his "ticket". He had been doing so well and we were therefore horrified to see him fall out of the machine from about 400ft (120m) when taking a rather steep bank turn. Another lamentable case of stupidity and careless loss of life, one might well think. So did the Accident Investigation Committee of the Royal Aero Club and thereafter made it compulsory for safety straps to be worn. Many pilots, however, were still reluctant to do so. It may be wondered why when the danger of falling out was so great and happened so often.

We never discussed this question between ourselves, but there is no doubt that we all shared much the same views that, being unhampered, if the machine got out of control and crashed, we should at least have an unhindered chance of making a jump for our lives just before the machine met the ground, where otherwise, we should most likely be pinned under the engine. The possibility of fire too was always present in our minds.

WAR CLOUDS GATHER

The general slackening of all flying activities everywhere was becoming more pronounced by July 31, 1914 — the date that marked the termination of my services with the British & Colonial Aeroplane Company, for reasons of a reduction in staff.



ABOVE ***Car customisation Edwardian-style — a handmade scale model of one of the Bristol school's Prier monoplanes made a delightful ornament for the bonnet of Merriam's motor car at Brooklands.***

LEFT ***Merriam (in driving seat and goggles) enjoys high jinks with Royal Naval Air Service friends in one of his motor cars in 1914. With the outbreak of war, despite failing his medical, Merriam became chief flying instructor for the RNAS at Hendon and later Chingford in Essex.***

The ominous hush over the whole of aviation was like the prelude to a great storm. Nobody seemed to know the reason, but indeed it was the gathering of the dark clouds of the Great War, which seemed even more foreboding to me as I considered my position. An out-of-work flying instructor with a disability was unlikely to be helpful! My accident was still fresh in the minds of those likely to require an instructor or test pilot. I was sick at heart too at leaving dear old Brooklands for reasons of what it had meant to us a community, as well as being the cradle and nursery of British aviation, where some of the best pilots of the world were trained.

Britain's declaration of war against Germany on August 4, 1914, had an immediate effect on all our aerodromes and pilots. There were others besides myself now wondering what was to become of them. A number of qualified pilots were at once absorbed into the Royal Naval Air Service (RNAS) and the Royal Flying Corps. I was offered a commission in the former, subject to my passing the medical, but in this I failed. Meanwhile, Claude Grahame-White engaged me for instructional work at his Hendon school, where it was becoming very busy teaching young probationary officers to fly for the RNAS.

AVIATION'S FUTURE: THE VIEW FROM 1956

I am often asked what I think the future of aviation has in store for us. It is difficult to say. Today, in the transitory stage, so to speak — from propeller to jet — inherent difficulties have to be overcome. It seems to me that the

Built at Hendon, Grahame-White XV serial number 1321 was accepted for RNAS service by Merriam at Chingford in April 1915. Merriam later undertook "long, thankless patrol flights in Short seaplanes, so tiring to handle in rough weather" from Cattewater and Padstow.

The Aviation Historian would like to thank F.W. Merriam's granddaughter, Sylvia Macintosh, for her generosity and invaluable assistance with the preparation of this series

LEFT ***A mid-1950s meeting of two Bristol legends; former Bristol school chief flying instructor F.W. Merriam (right) greets A.J. "Bill" Pegg, the company's chief test pilot from 1947, responsible for making the first flight of the mighty Brabazon airliner in September 1949 and the Britannia turboprop in 1952.***

right materials have yet to be found to build the airframes to cope with high flying and the speed of the jet motors. Another problem lies in the requirement of enormous airfields for the landings of high-speed heavily loaded aeroplanes. It is quite possible that designers and constructors in the near future will work on something that will not resemble an aeroplane at all, but will be more like a flying saucer.

I remember when I was a small child hearing big cannon booming away in the distance during Army exercises, and my father saying "That's going to bring the rain down!" I am sure he would agree with many of us today that the elements are being disturbed by atomic explosions, jets rushing through the air, the breaking of the sound barrier and so on.

The scientists, however, seem to disagree with this theory. We were called maniacs for flying in the early days. It seems to me that this term is more applicable to some of the present-day experimenters of the air. I believe in progress and enterprise, but within good common sense. Why all this mad rush to get here, or there, first?

Man is fast defeating himself and his purpose. In these circumstances the final outcome of flying could well bring about the end of civilisation, as may have happened many times before in the history of the world, and put us back where we were millions of years ago. There is one thing certain however. Soon, all too soon, my contemporaries and I will all have departed for a destination far beyond the reach of missiles, rockets, spaceships and the like.

After the end of the First World War Merriam continued to fly, taking a particular interest in gliding. He also freelanced as a test pilot, making several flights in the sole Saunders Kittiwake, G-EAUD (seen below), in March 1921. The following year Merriam organised the UK's first gliding school, on the Isle of Wight, and later established a consultancy business, Merriam's Aviation Bureau.

PHILIP JARRETT COLLECTION

TAH ARCHIVE

NINETY SECONDS OVER TOBRUK

The tragic death of Marshal Italo Balbo

75 years ago Italian defences at Tobruk shot down a trimotor being flown by Italo Balbo, Italy's leading aviator and one-time close ally of Benito Mussolini. Friction between the two has long fuelled speculation that Balbo's death was more than a tragic accident. But was it? GREGORY ALEGI provides the first in-depth analysis in English of those deadly 90 seconds

"THEY'RE COMING BACK!" someone shouted, pointing to the two black dots heading towards the landing ground known as T.2. Thick, coarse smoke rose from the wreckage of the smouldering IMAM Ro 37bis and Fiat CR.42 biplanes destroyed a few minutes earlier by a British air attack. A number of the CR.42s had been scrambled to attack the incoming bombers, but none even made it off the ground. Explosions pockmarked the afternoon sky above Tobruk, larger from naval guns and smaller from land-based light guns, mixed with a hail of machine-gun fire all around the bay, with an intensity which seemed to stretch time.

Suddenly, one of the dots broke off, dived and disappeared to the north-west. The other, seemingly oblivious to the blasts around it, continued towards T.2 in a curved landing pattern. It lost altitude and started trailing smoke and then flames. It pulled up, turned on its wing and crashed sharply into the ground, exploding into a ball of fire. The combat had lasted less than two minutes. Soldiers and airmen rushed to the burning wreck. It was only when they saw the third engine that the truth became shockingly clear: the aircraft was Italian. Worse yet, it was carrying Italo Balbo, the Governor General and Commander in Chief of the Italian Armed Forces in Libya (CSFAAS).

The death of Balbo and his crew of eight shocked Italy, which, after victories in Ethiopia and Spain, was exhausted rather than prepared for its third war in five years. In contrast with the terse communiqué issued with a two-line biography by the Italian Supreme Command — "On [June] the 28th [1940], flying above Tobruk during an enemy bombing raid, the aircraft flown by Italo Balbo fell in flames . . . the crew members died" — the accident dominated newspaper front pages. Just as Balbo's flying feats had symbolised a new Italy, strong and technologically advanced, so those successes were shattered by his death.

A rumour soon began spreading that Mussolini had ordered Balbo killed, to eliminate not just a rival but a determined opponent (see panel on page 57). Although historians have never proved the conspiracy theory, journalists have nevertheless kept the story alive. The latest round of revelations came after film director Folco Quilici, whose father Nello had died with Balbo, published his book *Tobruk 1940* (Mondadori, 2004), in which he mixed family memoirs with investigations in Libya. A number of veterans,

OPPOSITE PAGE ***Although Italo Balbo had been one of Benito Mussolini's closest allies during the latter's rise to power, by the time of his death at 44 Balbo had become disillusioned with Mussolini's ideology and anti-Jewish racial laws. The two strongmen were clearly drifting apart — but would* Il Duce *have had his rival eliminated?***

VIA AUTHOR x 2

ABOVE ***The Italian seaplane base at Tobruk Harbour, to the east of the port town on the northern side of Marsa Tobruk. The airfield Balbo and Porro were heading for, a mere 18 days after Italy's entry into the war, was T.2, a primitive diamond-shaped strip established by the Italians in the dunes on the southern side of Marsa Tobruk.***

and in some cases their sons by proxy, recalled opening fire on the Savoia-Marchetti S.79, albeit without any mention of conspiracies. Like many presumed mysteries, the Tobruk tragedy feeds on hearsay, innuendo and unverified "revelations" made decades after the event. Documents, including the papers of the investigation held by the Balbo family, tell a different story.

THE LAST DAY

Balbo began his last day at his headquarters in Derna, the port city in eastern Libya, meeting various people and protesting with the *Comando Aeronautico della Libia* (Libyan Air Force Command) against the wasteful use of aircraft against minor targets. The message was actually aimed at the Italian Tenth Army, which requested air support to compensate for its lack of firepower and mobility. But his main concern was the preparations for an inspection of the advanced echelons of the 2nd Libyan Division, which had just re-entered Sidi Azeis. The visit actually masked a bold action against British armoured cars (see panel on page 59).

In Derna, Balbo and his entourage prepared to board two armed S.79s devoid of passenger seats and windows. Balbo flew with his usual crew, comprising copilot *Maggiore* Ottavio Frailich, a veteran of Balbo's famous 1933 North Atlantic cruise; flight engineer *Capitano* Gino Cappannini, whose experience as an aviator went back to the 1920 Rome—Tokyo "raid" and included both of Balbo's famous Atlantic cruises, and radio operator *Maresciallo* Giuseppe Berti, another veteran of the latter flights. The second aircraft was flown by *Generale di squadra aerea* Felice Porro, CO of the Aeronautica della Libia, with copilot Capt Fausto Leardi and an unnamed flight engineer and wireless operator.

Anticipating the action, nobody wanted to stay

BELOW ***Savoia-Marchetti S.79 I-AGSB was one of two unarmed examples of the trimotor transport used by Balbo, but it is unlikely he was flying either on June 28, 1940. See panel on page 65. According to Italian pilots, the Sparviero (Sparrowhawk) was reportedly nicknamed "Gobbo Maledetto" — "damned hunchback" — by the RAF.***


TAH ARCHIVE

ITALO BALBO:
Heir apparent or thorn in Mussolini's side?

THE WIDESPREAD USE of the word "Balbo" to indicate a large aircraft formation is a modern legacy of the ambitious long-distance formation flights conceived and led by Italo Balbo during 1930–33. While this tribute recognises his flying achievements, it conceals the larger role he played as a political leader, father of the *Regia Aeronautica Italiana* and colonial governor.

Balbo was born on June 6, 1896, to a middle-class family in Quartesana, near Ferrara in northern Italy. The bright and exuberant Italo soon became involved in aviation and politics, moving to San Marino to complete his classical education. Aged 19, Balbo volunteered for military service on Italy's entry into war in the summer of 1915. The Army was wary of volunteers, however, and delayed calling Balbo up until September 1916. Having completed officer training, he reached the front in May 1917 and led his battalion's assault platoon. He was discharged in 1919 as a *Capitano* with three gallantry medals; one bronze and two silver.

After completing his university degree in social science in Florence, Balbo joined Benito Mussolini's nascent *Partito Nazionale Facista* (PNF — National Fascist Party) in February 1921. Balbo's strong organisational skills propelled him to the PNF's national directorate and in October 1922 he was one of the four leaders — the "Quadrumvirs" — of the Blackshirts' March on Rome, which symbolised Mussolini's rise to power. Balbo was duly rewarded and was made one of the founder members of the Fascist Council in 1923. The following year he was appointed commander of the Blackshirt militia and in 1925 became Undersecretary for the National Economy.

"THAT DEMOCRATIC SWINE . . ."

With little experience of aviation, Balbo was appointed Undersecretary for Aeronautics in November 1926. At the time the three-year-old organisation was underfunded, indifferently led and very much the poor relation of the War and Navy ministries, which accounted for some 85 per cent of the military budget. With a combination of political skill, strategic vision and personal charisma, Balbo quickly set about making changes to Italian aviation and its organisation. Stability, standardisation, professionalism and propaganda became the four pillars of a programme designed to move the Regia Aeronautica from a semi-sporting establishment to a militarily effective organisation.

Leading by example, Balbo earned his wings in June 1927 and became Air Minister in September 1929. In December 1930 he set off on the first of the long-distance flights for which he would become world-famous, leading a group of 12 Savoia-Marchetti S.55 flying-boats from Italy to Rio de Janeiro in Brazil, where he arrived on January 15, 1931. During July–August 1933 Balbo led a formation of 24 flying-boats from Orbetello in Tuscany to Chicago and New York before returning to Italy. Mussolini rewarded Balbo's achievement by promoting him *Maresciallo dell'Aria* (Air Marshal) and in November 1933 appointed Balbo Governor-General of the Italian colony of Libya.

Setting aside his initial shock at what he perceived to be a demotion to curb his influence, Balbo once again set to work. His main goals were the economic development of the colony and improved relations with the population, still suffering from brutally effective Italian repression. The posting to Libya gave Balbo further opportunities to fly, both to explore the colony and to commute to Italy. Declared type-rated in every Italian aircraft then available, Balbo had amassed some 2,750 flying hours by June 1940. The Libyan period also marked Balbo's steadily increasing disillusionment with Mussolini. The long-distance flyer strongly opposed the latter's racial laws, saw *Il Duce's* alliance with Germany as a mistake (prophesying that Italy would "end up shining Germany's shoes") and argued against entering another war (which he called "historic idiocy"). Balbo's opposition was such that Mussolini reportedly referred to Balbo as "that democratic swine". By June 1940 relations between the two were at a low ebb, prompting speculation that Balbo's death may in fact have been ordered secretly by Mussolini. **GA**


VIA AUTHOR x 2

ABOVE LEFT ***Balbo's copilot*** **Maggiore** ***Ottavio Frailich (nearest camera) — a veteran of the famous 1933 record-setting transatlantic long-distance formation flight — aboard an S.79 before his death on June 28, 1940.*** **ABOVE RIGHT** ***Balbo's brother-in-law*** **Tenente** ***Cino Florio, who was also aboard Balbo's S.79 on its last fateful flight.***

behind and Balbo juggled the list. Eventually, he took off with Nello Quilici, the journalist who had joined him in Libya to run "Office X", in charge of "press, censorship, his office, a bit of everything"; Enrico Caretti, the secretary of the Tripoli branch of the *Partito Nazionale Fascista*; Claudio Brunelli, head of the Libyan Tourism and Hotel Agency; *Tenente* Lino Balbo, son of Italo's deceased brother Fausto; and Tenente Cino Florio, brother of Italo's wife Emanuella. Along with his crew, Porro carried *Generale di divisione* Giuseppe Tellera, CSFAAS Chief of Staff; *Generale di brigata aerea* Egisto Perino, who was on an inspection tour on behalf of Generale di squadra aerea Francesco Pricolo, Undersecretary for Air and *Regia Aeronautica* Chief of Staff, and *Tenente colonello* Rosario Sorrentino, Chief of the CSFAAS Operations Office. Porro was also joined by official war photographer Arrigo Goldoni, who was instructed by Balbo to switch aircraft in order to photograph the latter's S.79 in flight.

The trimotors took off from Derna at 1700hr, with Balbo leading and Porro as his wingman to port. They set course for 123° and climbed slowly, reaching 1,000m (3,300ft) over the Gulf of Bomba before starting a moderate descent. Both aircraft were supposed to fly a 360° turn over Ain el-Gazala for recognition purposes, but Porro later admitted that this was overlooked. The T.2 landing ground came into sight at around 1730hr. Located at Sidi Mahmud, on the ridge opposite Tobruk harbour but still within its defensive perimeter, T.2 was classified as a "secret armed airfield". In reality it was nothing but sand, ringed by fuel drums and barely equipped with a windsock, spotting platform and tents. This barren field was home to the 8° *Gruppo* (Group) of the 2° *Stormo* (Wing), equipped with Fiat CR.32 and CR.42 biplane fighters; the 10° Gruppo of the 4° Stormo (CR.42s); the 12° Gruppo of the 50° Stormo, a ground-attack unit flying CR.32s, Breda Ba 65s and Caproni Ca 310s, and to the 127ª *Squadriglia* (squadron), equipped with Ro 37bis observation biplanes.

Crucially, T.2 had no radio and received all information by landline from Tobruk. For this reason Balbo had instructed Generale di brigata aerea Ferdinando Silvestri, Air Commander of Eastern Libya, to precede him and warn the resident units that two S.79s would arrive at around 1730hr to collect their escort and proceed to Sidi Azeis. Silvestri left Derna in his Caproni Ca 309 Ghibli just before 1600hr and reached T.2 at around 1645hr. He had given orders to Capt Giuseppe D'Agostinis, commanding officer of the 91ª Squadriglia of the 10th Gruppo, and after spending less than 10min on the ground, took off again with three fighters, heading for Sidi Azeis, where he landed without incident 30min later.

THE BRITISH ATTACK

Silvestri missed by a few minutes a major RAF attack on T.2. While conclusive proof of which unit it was has so far eluded researchers, 12–15 British aircraft destroyed several Italian machines on the ground and left some 20 dead and 51 wounded. Anti-aircraft defences opened fire, without much success; and what the Italians have always identified as Bristol Blenheims, possibly of No 113 Sqn, left the scene. According to the official inquiry, no "all-clear" signal was given.

Porro and three of his crew (Sorrentino, Tellera and Perino) later testified that the approaching S.79s noticed smoke rising from the ground and understood T.2 to be under attack. In 1948 Porro added that he pulled in "very close to Balbo's aircraft to advise him to change course further south in order to avoid overflying the field and get caught between English bombs and anti-aircraft defensive fire. But as much as my copilot and I gestured, he [Balbo] saw nothing because he was staring at the bombed airfield". According to Tellera, almost everyone aboard the S.79 saw the tracers from the anti-aircraft guns coming from

SPRINGING THE TRAP:

Why was Balbo flying to Tobruk on Friday June 28, 1940?

IN 1948 FELICE Porro revealed that Balbo's sudden frontline inspection in June 1940 was a cover for a trap that the Marshal intended to spring on British armoured cars conducting harassment raids behind enemy lines. Initially taken by surprise, the Italians had countered these attacks with aircraft co-operating with army units. The Italian capture of a Morris CS9 light armoured car of the British Army's 11th Hussars (Prince Albert's Own) at Bir el Gubi on June 21, 1940, gave Balbo a different idea.

That morning 2nd Troop of B Squadron of the 11th Hussars, under Troop Sergeant Major Howarth, set out on a reconnaissance sortie and soon ran into some Italian trucks. Forced to retreat by artillery fire, 2nd Troop received some support by RAF aircraft and claimed to have set an enemy truck on fire. At 0945hr 2nd Troop reported being "in observation south of el Gubi"; by 1110hr it reported that its Morris armoured car was "wrecked" but that the other cars had safely dispersed. Second Lieutenant Halliday was sent to the rescue, but at 1145hr 2nd Troop found itself under attack. A few minutes later, surrounded by Italian tankettes, Howarth and his men surrendered.

BALBO'S "MOUSETRAP" IDEA

The Morris, immobilised by a broken wheel, had been spotted by Balbo from the air as his S.79 came in to land at Bir el Gubi. Balbo and his nephew Lino jumped into a waiting car and rushed to the 2nd Libyan Division HQ, ordering it into action. While photographer Arrigo Goldoni recorded the scene and the Morris was towed to the divisional HQ, Balbo briefly spoke with Howarth and examined a British helmet. According to his grandson, Stefano Pischedda, Balbo apparently commented: "I see they too are cheated by their suppliers!". The four Hussars then boarded the S.79 and were flown to Tobruk with Lino keeping armed guard over them. Before handing the prisoners over to the Tobruk Carabinieri, Balbo lent them money for immediate necessities.

The capture of the Morris was a prelude to an idea that had formed in Balbo's mind; specifically, provoking the British by landing an S.79 trimotor in "no-man's land". Should British armoured cars swallow the bait, they would be spotted by an Italian high-altitude aircraft, which would scramble Italian fighters and unleash a motorised detachment from Ridotta (Fort) Capuzzo near the Libyan–Egyptian border. Balbo saw in this an opportunity to bolster morale and reap propaganda benefits. Porro and his other colleagues counselled strongly against the Governor taking a direct role in the action, which they considered too dangerous. Balbo prevailed, however, and set out on his fateful last flight on June 28, 1940. **GA**

TOP ***Balbo (far left, in glasses) talks to captured members of the British Army's 2nd Troop, B Squadron, of the 11th Hussars after the latter had been overrun at Bir el Gubi, 25 miles (40km) south-east of Tobruk, on Friday June 21, 1940, exactly a week before Balbo's death.***

RIGHT ***The Morris CS9 light armoured car accommodated a crew of four and was first tested in 1936. The vehicle was used to limited effect in the Battle of France, and 30 served with the 11th Hussars in North Africa, where it was found that it performed well on sand.***

VIA AUTHOR x 2

PHILIP JARRETT COLLECTION

ABOVE ***Pilots of the RAF's No 113 Sqn chat beside a Bristol Blenheim I before a sortie from Ma'aten Bagush, near Mersa Matruh in Egypt, where the unit was based from early June 1940 to January 1941. Research has yet to prove conclusively that the raid on T.2 on June 28 was undertaken by No 113 Sqn, but it is the most likely candidate.***

the coastal batteries and a naval unit anchored in the bay; Perino added that a "well-centred" salvo exploded very close to them.

Instinctively the S.79 pilots broke formation and took different directions. Porro broke to port, brusquely enough that some aboard thought they had been hit, overtook Balbo and dived for the open sea, overflying the anti-aircraft cruiser *San Giorgio*, passing over a hill north of the harbour and finally escaping at wavetop height. Balbo's aircraft, they noted, was heading for the coast. Goldoni, possibly in the "hump" gun position, photographed everything.

Balbo had apparently decided to land at T.2. Several witnesses, including *Colonello* Marziale Cerutti, a 17-victory World War One ace, then commanding the Brigade comprised of the 2° and 50° Stormi, and later Livio Vittori, in a 1957 letter to the Air Force Historical Office, recalled seeing the undercarriage extending. According to the S.79 manual, the extension procedure took about 20sec at an airspeed not greater than 170km/h (106 m.p.h.). The trimotor was a sitting duck. Unsurprisingly, it was hit.

"I clearly saw smoke and flames coming out [of the S.79], smoke first and flames immediately after, localised in the left [port] undercarriage [unit] of the lead aircraft", testified Col Ernesto Rossanigo, who was organising the emergency services after the RAF raid. "While the aircraft headed straight for the airfield, nose down, with roaring engines, the flames on board grew stronger. The aircraft

The remains of a 4° Stormo Fiat CR.42 at T.2 after the RAF raid on June 28. A number of CR.42s were scrambled to intercept what is believed to have been a force of Blenheims, but none managed to get airborne to defend the landing ground.

VIA AUTHOR

T&H ARCHIVE

LEFT ***Balbo's transatlantic formation flights of 1930 and 1933 earned him the respect of fellow pilots and public alike. The latter flight to the USA, in which he led 24 S.55 flying-boats from Orbetello to Chicago, resulted in the American city renaming Seventh Street Balbo Avenue — it still bears his name as Balbo Drive — and staging a parade in the Italian aviator's honour.***

flew perhaps 2,000m [6,500ft] in a straight line, then pulled up sharply, pivoted around a wing and fell straight down at about 300m [1,000ft]".

Several other witnesses described the same scene, with Tenente colonello Paolo Vercelli and Capt Guido Fratini adding that a fuel tank had exploded "at about 50m [150ft] from the ground. Vittori added that the S.79 had been hit at an altitude of about 100–150m (300–500ft) while it was "banking sharply to the left" and confirmed the explosion at 50m altitude. Perino and Tellera testified immediately that the explosion was large enough to be perceived even aboard Porro's fleeing S.79, echoed in 1948 by Porro; Goldoni apparently photographed it. Everybody immediately feared that it may have been Balbo's aircraft. Porro turned to the west to Ain el-Gazala, where he landed at around 1810hr. He then jumped into a car and drove back to T.2, where his worst fears were confirmed. Because of the smouldering fire, heat and darkness, it was only in the morning that the remains of the crew were found, removed and tentatively identified.

Tellera did not wait for a positive identification. At 2140hr he telegraphed the Italian supreme commander, *Maresciallo* Pietro Badoglio, informing him of Balbo's death. The message was written in the Regia Aeronautica's *Aquila* (Eagle) code, which the Army staff only decoded at 0215hr. Mussolini, who was visiting troops on the French front, was informed during the morning of the 29th by the *Carabinieri* (Italian military police) and immediately sent official condolences. Badoglio appointed Gen Italo Gariboldi as an interim replacement for Balbo.

CONSPIRACY OR CONFUSION?

The tragedy immediately raised two questions: who shot down Balbo and how could such an accident happen? The answer to the first was provided by Tellera, who sent a chronological report, which concluded with the following:

"According to the information gathered, it appears that the Air Marshal's aircraft was hit by an incendiary round from our [own] anti-aircraft defences and immediately fell in flames."

The report also attributed to "fate" the arrival of the two S.79s "a few minutes after the enemy raid — which started at 1710hr — before the all-clear signal had been given". Another report was prepared on July 1, 1940, by Perino for Pricolo, who forwarded it to Mussolini. The Tellera and Perino reports were discovered by the Allies in Rome in 1944, taken to Washington DC, put on microfilm and eventually returned to Italy.

On June 29, 1940, Gen Mario Berti, commander of the Tenth Army, instructed his subordinate Gen Enrico Pitassi Mannella, commander of XXII Corps, to undertake a comprehensive inquiry. This was not to be a technical investigation; indeed, Pitassi Manella omitted to record key details about the aircraft and even the complete list of Porro's crew. He did, however, formally take testimony from 11 witnesses from different perspectives, some of whom also reported what they had learned from other sources (Silvestri, for instance, cited Capt D'Agostinis). From these interviews Pitassi Mannella compiled a formal report entitled *Findings of the Investigation Undertaken Regarding the Shooting Down of the Aircraft Carrying Marshal Balbo*, which was delivered by Berti on July 7 to Maresciallo Rodolfo Graziani, who had meanwhile arrived in Libya to replace Balbo.

The Pitassi Mannella report is not in the Graziani papers held by the *Archivio Centrale dello Stato* (the Italian national archives), but a copy is privately held by the Balbo family. The family obtained it through Col Ivo Levi, the former commander of the Carabinieri in Libya, who remained friends with Balbo despite being forced out of the service by the 1938 racial laws. Despite its limitations, the Pitassi Mannella material provides a wealth of first-hand testimony, untainted by fading

The S.79 was arguably Italy's most significant military aircraft of the late 1930s, being rugged, fast — and, with more than 1,200 produced between 1936 and mid-1943, built in substantial numbers. The type saw service with Italian units during the Spanish Civil War and set several international records before Italy's entry into the war.
CESARE GORI VIA AUTHOR

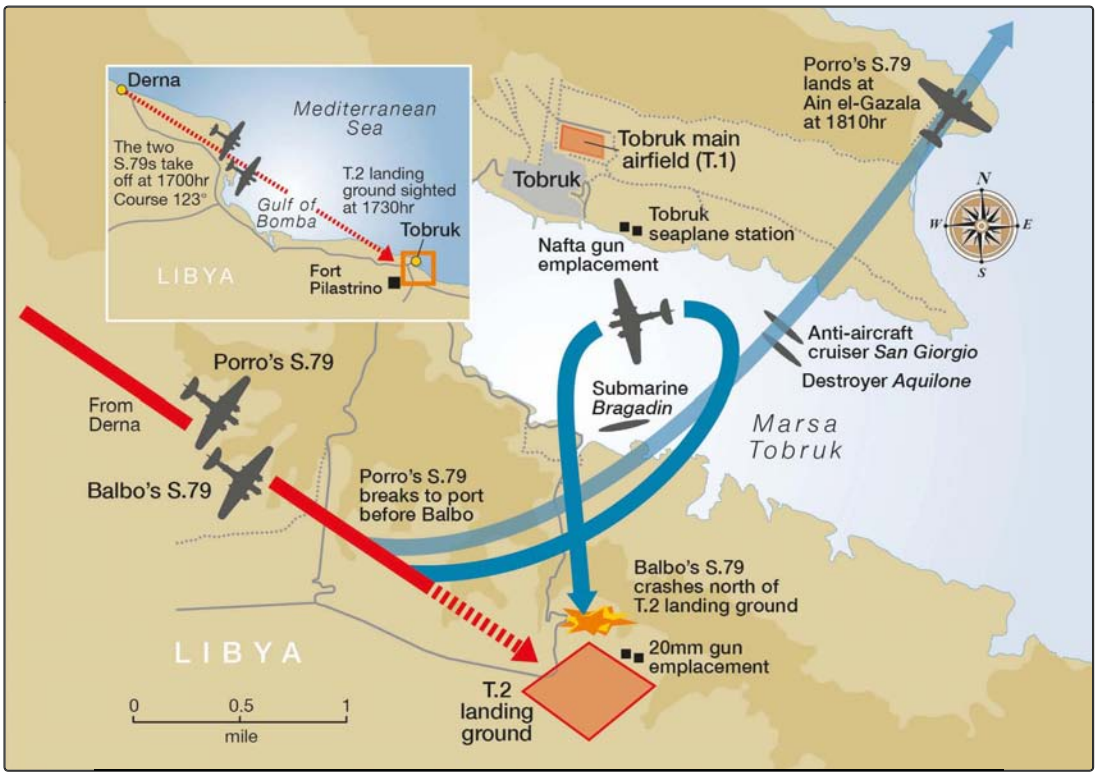
VIA AUTHOR

ABOVE ***Although Balbo's S.79 came under fire from high-calibre anti-aircraft artillery, as seen here, inquiry leader Pitassi Mannella believed that it was more likely that the Marshal's trimotor was hit by concentrations of fire from smaller-calibre machine-gun positions.***

memory or the incorporation of later narratives. Appended to the report was the number of rounds fired by the Army and Navy batteries over a period of some 40–50sec. The Italian anti-aircraft ship *San Giorgio*, the most frequently cited culprit, had fired six 100mm anti-aircraft rounds and 90 x 13·2mm machine-gun rounds. Ground battery Tonno had fired a handful of 13·2mm rounds "against second aircraft" (presumably Porro's); the Tortora ground battery had also fired four "against second aircraft" and Tordo fired 12 "against first aircraft". The 13·2mm guns at Porta Sollum had fired ten at both aircraft and the Nafta battery 60 "against aircraft heading north". Once over T.2, Balbo's S.79 was fired on by local defence units, armed with World War One-vintage 8mm Schwarzlose machine-guns. The list was comprehensive rather than exhaustive.

At least two major omissions have been established beyond doubt. In 1949 Golfiero Colonna claimed in the weekly publication *L'Elefante* to have "shot down Balbo" when he was the gunnery director aboard the destroyer *Aquilone*, recalling how shock and guilt had replaced pride on his learning the true identity of what he had mistaken for a British aircraft. In 2006 Antonio Percovich recalled that he had opened fire from the destroyer *Turbine* and Aldo Massa said the same for the submarine *Bragadin*.

Pitassi Mannella stated that the two S.79s had appeared over Tobruk at 1730hr–1732hr, and observed that while "few shots were fired by



MAP BY MAGGIE NELSON

cannon (calibre 76mm or greater), many more were fired by machine-guns" and identified the causes in the following order:

- non-recognition of the aircraft;
- their arrival in proximity to the RAF attack;
- the lack of warning of their arrival and direction "out of the sun".

"I exclude", he stated, "that the shooting down of the aircraft carrying Marshal Balbo should or might be attributed to anybody's responsibility or fault. It was a tragic fatality, attributable to fate and not to men." He concluded:

"I cannot, however, refrain from observing that it would have been better, in terms of prudence, particularly considering the rank of the person involved, to give prior warning to the Territorial Air Defence HQ."

The conclusions satisfied Emanuella Balbo, the widow of the Governor; and her three children, Giuliana, Valeria and Paolo, remained so with the official explanation throughout their lives.

In addition to ruling out malicious intent, Pitassi Mannella also refused to be drawn into a futile attempt to identify an individual shooter, explaining that "several batteries fired with 37mm and 13mm guns, and a single one, the *San Giorgio*, with 100mm guns. It was not possible to try to identify which one might have caused the aircraft to be shot down. Some witnesses claim to have seen gunshots very close to the aircraft, but this has little evidentiary value because, as is well known, shots very far from an aircraft can appear very close to a given observer.

"Others say that the aircraft was hit by machine-gun fire, and these could be more reliable because the trails of machine-gun tracer rounds offer a sounder base for judgment. I am much more inclined to believe that the aircraft fell because it was hit by machine-gun fire. A full hit from a cannon would have certainly caused a more precipitous crash.

"While this is admitted, it proved absolutely impossible to establish which gun or group of guns hit the aircraft. But after identifying which guns opened fire, I do not think this to be of great importance. It is beyond doubt that all the batteries that opened fire believed they were facing the enemy, and therefore all fired to hit, without distinction. Chance alone allowed one, and maybe more than one, actually to hit."

THROUGH MODERN EYES

Some 75 years after the accident the broad conclusions of the three investigations remain factually unchallenged. No convincing evidence of an alleged Mussolini-led conspiracy has ever surfaced, nor has any rumour survived a modicum of investigation. At the same time, from an air accident investigation perspective "fate" is not a satisfactory causal explanation.

Of the three categories found in modern investigations — technical factors, human elements and organisational aspects — technical causes are ruled out by the dynamics of the event.

ITAF HISTORICAL OFFICE

ABOVE ***The wreck of Balbo's S.79 at the crash site north of T.2 overlooking Marsa Tobruk. Balbo's remains were buried in Tripoli on July 3, 1940. In a letter to his opposite number in Tripoli, Arthur Longmore, the RAF's AOC-in-C in the Middle East, described Balbo as "a great leader and gallant aviator . . . whom fate placed on the other side".***

Regarding the human factor, Balbo, Frailich, Cappannini and Berti were undoubtedly trained, competent and proficient, as well as used to working together as a team. Having said this, the crew did lack air combat experience; unlike Porro, a former First World War air observer, Balbo and Frailich had never been under fire in an aircraft, which may have led them to underestimate the danger in continuing with the landing, and which may have been compounded by the personal physical courage which led Balbo to set an example by leading in person, much as he had done as a platoon commander.

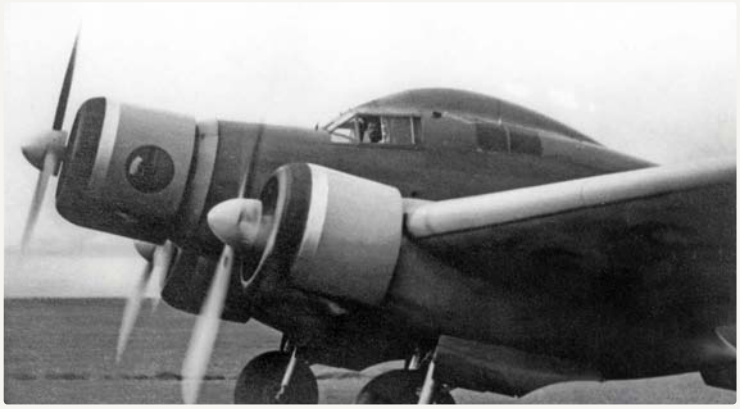
While Pitassi Mannella was wrong in decrying the lack of prior warning, his conclusion is correct insofar as it points to an organisational root cause of the event, specifically the archaic communications system, as evidenced not only by the recognition procedure calling for incoming aircraft to fly a 360° turn over an agreed location but also by the need to send Silvestri ahead to warn that the Governor would be arriving. There was also an apparent lack of binoculars and aircraft recognition charts on the ground. Despite this, *Capitano di corvetta* Antonio Ciampo testified that the battery at Fort Pilastrino, 7–8km (4½–5 miles) west of Tobruk, had recognised the two aircraft as Italian and tried to alert the Tobruk air defence HQ by telephone, as did the Tordo battery. The message reached only some batteries because the RAF attack had severed a telephone mains, cutting off the entire eastern defence sector for about 45min.

Porro reported that a T.2 telephone operator continued calling Tobruk during the RAF attack, receiving no answer because the operator at the other end had run to his shelter. In any case, at a groundspeed of around 320km/h (195 m.p.h.), the S.79s would have taken about 90sec to fly from Fort Pilastrino to Tobruk, too short a time for the warning to trickle through the network. Conversely, the time would have sufficed to warn incoming aircraft of the raid and order them to stay away. But T.2 had no radio.

The situation was not much different in the air. The lack of permanent radio installations at T.2 fitted in with the Regia Aeronautica's lack of proper communications systems, both air-to-ground and air-to-air. While the S.79 was equipped with radio, all communications were in Morse code and there was no intercom between pilot and operator, which meant scribbling messages on pads passed back and forth. This method, highly impractical in an emergency and especially so in combat, explains why Porro resorted to waggling his wings to attract Balbo's attention. It probably also coincides with Maj Moro's recollection: "I had the impression that in approaching the airfield the aircraft [was] manœuvred to show its Italian colours and markings". Even this would have been fruitless with the sun behind the aircraft.

CONCLUSIONS

Amid the rising clouds of dust, billowing smoke and general chaos of an RAF raid, the Italian air defences did what they were expected to do. Indeed, the 2° *Squadra Aerea*, based in Sicily, confirmed its standard air-defence procedure on July 21, 1940, less than a month after the tragedy at T.2. "Batteries shall open fire against any aircraft whose identification is in doubt", it informed the



VIA AUTHOR

AN ENDURING MYSTERY:

Which S.79 was Balbo flying on his last day?

IT IS OFTEN STATED that Balbo died in Savoia-Marchetti S.79 I-MANU, but in fact no such aircraft existed. The Air Marshal chose registrations patterned on the names of family members, including his children Giuliana (Fieseler Fi 156 Storch I-ULIA), Valeria (Cant Z.1012 I-IEIA) and Paolo (Cant Z.506 I-PAUL), and his wife Emanuella Florio (I-MANU). Between 1937 and 1940 the latter was carried in succession by a Caproni Ca 310, a Savoia-Marchetti S.83 and a Savoia-Marchetti S.75. The unarmed S.79s assigned to Balbo during this period were I-AGSA and 'GSB (the latter as seen **ABOVE**), but there is little doubt that on June 28, 1940, he was flying neither of these.

Despite extensive research and the assistance of S.79 specialist and *10° Stormo* historian Cesare Gori, the exact identity of the S.79 Balbo flew on his fateful last sortie remains unknown. What is certain is that the factory-fresh trimotor was delivered from Milan-Bresso by a crew from the *Nucleo Addestramento* (Training Flight) of the 10° Stormo, which prepared the machine thoroughly. The ferry flight staged through Tripoli and Benghazi. Journalist Nello Quilici recorded its arrival at Derna on the evening of June 18, commenting that it was "not in order". Whatever the problems may have been, these had been sorted by the 21st, when Quilici described the aircraft as "a true instrument of war", painted "lead grey", carrying "three machine-guns" (this may be a mistake, as the S.79 could carry up to five) and having little room for passengers, who were "tightly packed and standing".

Owing to the lack of a proper accident investigation, load details are unavailable. The fact that the wreck burned for hours suggests a full load of 87-octane gasoline. The S.79 could carry up to 3,320lit (730gal) in ten main wing tanks plus 40lit (9gal) in a small reserve tank, 2,500lit (550gal) being a normal load. Given the heavy load on June 28, the three 680 h.p. Alfa Romeo 126 engines would have burned about 550lit/hr (120gal/hr), one-third more than the best cruise rate. This means that Balbo probably approached T.2 with about 2,200lit (485gal) on board. In addition to 1,350 x 12·7mm (0·5in) rounds and an unspecified number of 7·7mm (0·303in) Lewis machine-gun magazines, the S.79 was loaded with additional guns, ammunition and hand grenades for the armoured-car trap. **GA**

Navy harbour commands in Tobruk, Tripoli and Benghazi. "Should fire be mistakenly opened against national aircraft, these shall immediately make a 180° turn, then repeat the manœuvre and lose altitude. When this happens, anti-aircraft artillery must cease fire immediately."

No matter how neat they appeared on paper, these elegant manœuvres would be of extremely limited value in the fog of war, as the loss of Balbo clearly proved. Ultimately the tragedy was caused by a breakdown in communications, exacerbated by an archaic air-defence and air-field operations concept hindered by a lack of appropriate technology. The responsibility for this muddled and inefficient system fell at least indirectly to Balbo himself, who as Governor and theatre commander for more than six years could have instituted better training and procedures.

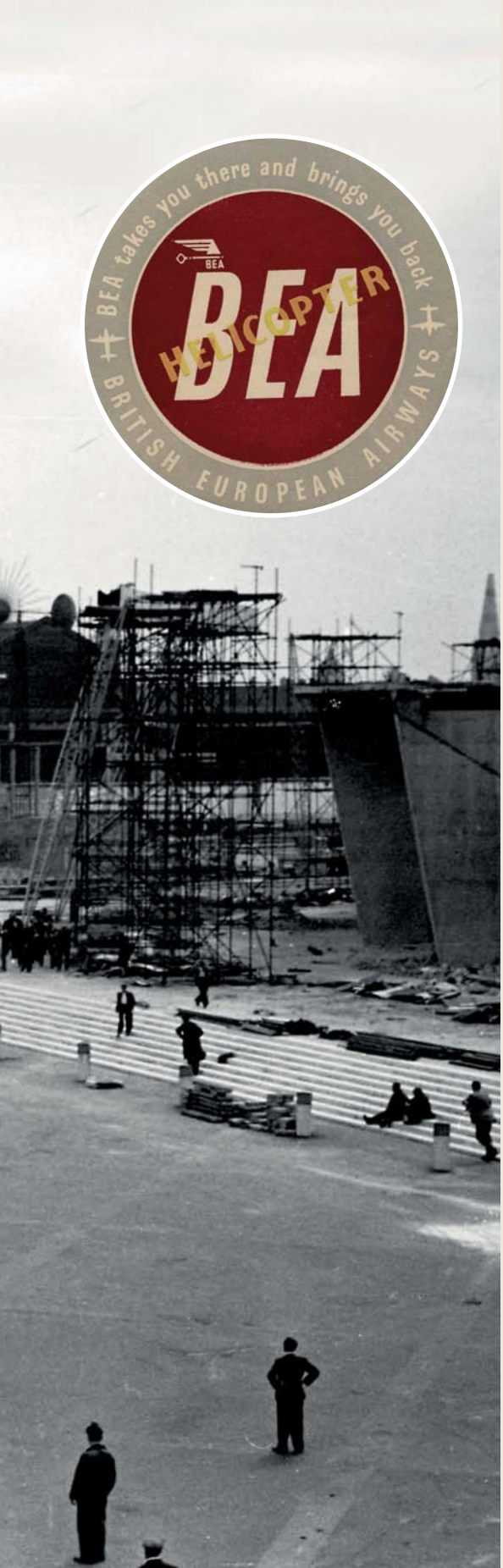
There is no "silver bullet" when it comes to Balbo's death; it was more than likely many bullets that came from local air defences, which had little trouble in hitting the large trimotor on short finals. Significantly, while there is no lack of witnesses claiming to have pulled the trigger, none has ever mentioned receiving instructions to fire at a specific aircraft; shoot first, ask questions later was the prevailing philosophy. Even in the lean post-war years, when there was a healthy market for personal memoirs of the "Mussolini and me" variety, nobody stepped forward to cash in on the story. Porro always stuck unswervingly to his version of events, as did Leardi in an interview in his later years. Goldoni always refused to sell his photographs for publication.

To this day, for many Italians the death of Italo Balbo rings of conspiracy, not unlike the events in Dallas in November 1963 for many Americans. Everyone remembered where they were at the time of the accident, or when they learned of it. Like most conspiracy theories, the Mussolini plot need not be factually consistent, founded on primary evidence or even practically demonstrated. And so a popular myth lives on. As the old saying goes — never let the facts get in the way of a good story.

ACKNOWLEDGMENTS *The author would like to thank Paolo Balbo, Stefano Pischedda, Folco Quilici, the late Gen Alberto Briganti and his son Franco, the late Flondar Brunelli, Giancarlo Garello, the Archivio Centrale dello Stato and the Historical Offices of the Italian Air Force and Navy for their vital assistance*

One of Britain's most respected aviation journalists and authors, John Stroud (born April 3, 1919) joined Imperial Airways aged 14. Six years later he became a freelance aviation writer and in 1963 was appointed General Editor of the definitive Putnam series of aeronautical books. Also a talented photographer, John continued to contribute articles to the British aviation press until his death in March 2007. In 2014 a substantial part of John's archive, including numerous rolls of previously unseen 35mm film, was acquired by A Flying History Ltd and forms the basis of this regular *TAH* series

The John Stroud Archive



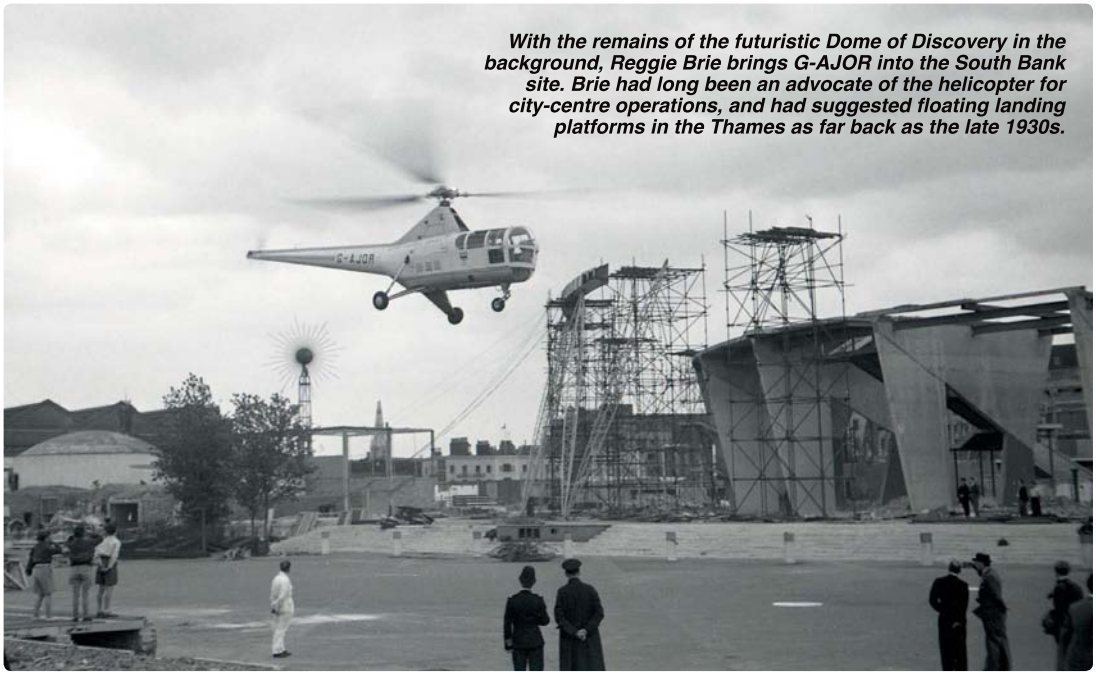
THE SOUTH BANK SHOW

In July 1952 John was granted free access to document the BEA Helicopter Experimental Unit's trial flights in and out of a diminutive landing area located among the remains of the previous year's Festival of Britain, on the south bank of the Thames next to Waterloo station

FOR TWO WEEKS in the summer of 1952 occupants of the numerous offices that fringed the south bank of the River Thames became accustomed to the sight — and not inconsiderable sound — of a pair of helicopters buzzing and whirring their way to a makeshift landing area a few short steps away from bustling Waterloo station. With the remains of the previous year's Festival of Britain still being dismantled — most notably Ralph Tubbs's impressive 365ft-diameter 93ft-tall Dome of Discovery — British European Airways (BEA) was keen to make use of this prime real-estate a stone's throw from the heart of the capital, virtually in the shadow of the Houses of Parliament just across the river.

London County Council (LCC), which occupied County Hall, immediately adjacent to the Festival site, was less keen, however. It consistently raised objections to the idea of a permanent "rotorstation" on the grounds of noise pollution and safety concerns — both reasonable enough — and also had its own agenda to establish a home for the National Theatre and an exhibition space, as well as offices, alongside the only permanent survivor of the previous year's celebrations: the Royal Festival Hall.

MAIN IMAGE ***On July 28, 1952, John Stroud was on hand at the former Festival of Britain site on the south bank of the Thames to capture Wg Cdr Reggie Brie landing BEA S-51 G-AJOR in the first of a series of trials.*** **INSET, OPPOSITE** ***Two days later Bristol Type 171 Mk 3 G-ALSR was flown in.***



With the remains of the futuristic Dome of Discovery in the background, Reggie Brie brings G-AJOR into the South Bank site. Brie had long been an advocate of the helicopter for city-centre operations, and had suggested floating landing platforms in the Thames as far back as the late 1930s.

Since the advent of the practical helicopter in the 1930s, its unique characteristic as a mode of transport — the ability to travel the shortest distance between two points and land without the provision of a long runway — has proven attractive for those interested in providing a form of mass transport capable of inserting passengers directly into the urban fabric.

With this in mind BEA quickly seized the opportunity afforded by the availability of a vacant suitable landing ground in the centre of the city to request permission to conduct helicopter trials in and out of the South Bank site. With permission granted, one of the BEA Helicopter Experimental Unit's four-seat single-engined Sikorsky S-51s, G-AJOV, made a trial flight along the Thames on Monday March 17, 1952, from London Airport (Heathrow), tracing a route over Hounslow Heath, Richmond Park, Barnes Common, Hurlingham and Battersea Park. From there it continued downstream at low altitude past Blackfriars Bridge to Tower Bridge before returning the way it had come.

With the approaches satisfactorily tested and surveyed for potential obstructions, and noise tests completed on the ground, further permission was obtained to begin landing trials on the former Festival site.

On Monday July 28, 1952, the head of the BEA Helicopter Experimental Unit (HEU), Wg Cdr R.A.C. "Reggie" Brie, took off from Gatwick in S-51 G-AJOR, and, after passing over Barnes Common and Hurlingham, followed the Thames to alight at the South Bank site on the first day of

Sikorsky-built S-51 G-AJOR, named* Sir Owen *in BEA service, was one of four operated by the airline in the early days of its helicopter fleet, and was powered by a single vertically-mounted 450 h.p. Pratt & Whitney R-985 Wasp Junior B4 radial piston engine. This example served with BEA until it was sold to Autair Helicopters in July 1953.

Up, up and away — Brie lifts G-AJOR over the river towards the imposing sight of Whitehall Court on the northern bank of the Thames. Following his initial flights in and out of the South Bank site, Brie (holding hat, BELOW) left the flying to Capts "Jock" Cameron (left) and J.G. Theilmann (flying the S-51).

two weeks of helicopter trials in and out of the city centre. On hand for at least some of the trials was freelance aviation reporter and photographer John Stroud; he was asked to investigate by weekly aviation magazine *Flight*, the Stamford Street offices of which were a 10min walk away.

Two days later another flight into the South Bank site was made, this time using one of the Bristol Type 171 Mk 3 prototypes, G-ALSR, which the HEU had leased from the manufacturer for evaluation the previous year. It was planned that both machines would be used to make flights in and out of the site and over the Houses of Parliament at a height of 500ft in order to assess noise levels in the chambers of both Houses. Noise measurements would also be made in the offices of County Hall.

TO THE LORDS BY WHIRLYBIRD

On the following Thursday, July 31, history was made with the arrival of the first peer to fly to a House of Lords debate by helicopter. With perhaps more than one eye on publicity, BEA's chairman, Lord Douglas of Kirtleside (aka Marshal of the Royal Air Force William Sholto Douglas), flew in from Northolt in G-ALSR to attend a debate across the river. According to His Lordship, he had allowed himself 2min to walk from his office at Northolt, west of London, to the helicopter, in which pilot Capt J.A. "Jock" Cameron was waiting; another 10min from take-off to touchdown at the South Bank site; 2min for rotor rundown and a final 2min to Westminster by car — a total of 16min. He did, however, find another 15min to extol the virtues of the downtown city heliport to the band of journalists that had been posted to cover his arrival. "I think we shall have really big helicopters coming into London in five to ten years", he predicted. Accompanying Douglas were BEA's deputy chairman, Sir John Keeling, and the director of the airline's helicopter development unit, Dr G. Hislop.

The future of the South Bank site as a rotorstation appeared promising, although when asked in the House of Commons in early July 1952 about whether a final decision on the matter had been

ABOVE ***Joining S-51 G-AJOR for the trials was Bristol Type 171 Mk 3 prototype G-ALSR, which had been leased to BEA by Westland from November 1951 for evaluation. As the results were satisfactory, two Type 171s were ordered by BEA in July 1952; G-ALSR was returned, but rejoined the airline to become*** **Sir Gareth** ***in July 1953.***

ABOVE ***With the modernist windmill of the Festival of Britain's Country Pavilion in the background representing what had been and the elegant curve of the as-yet unfinished Waterloo Air Terminal marking what was to come, G-ALSR is prepared for another flight out of the narrow confines of the South Bank site during July—August 1952.***

Developed from the Festival of Britain's Station Gate at a cost of £90,000, BEA's new Waterloo Air Terminal opened for business on May 19, 1953, and was officially opened two days later by the Minister of Civil Aviation, Alan Lennox-Boyd. The building was demolished in the late 1950s and is now part of the site of Sir Howard Robertson's Shell Centre.

made, Reginald Maudling, junior minister for the Ministry of Aviation, replied that "it would be misleading the public if the impression were given that the regular operation of helicopters to a point in the Metropolitan area is likely to be possible in the very near future".

In its August 1, 1952, editorial, *Flight* continued to express its support for the concept of city-centre heliports, but voiced concern that "it does not require flights in and out of the South Bank site to prove that experienced pilots can land a helicopter there, nor need they be made to discover that at the moment it is a rather bad site from the pilot's point of view. To put a single-engined helicopter down in a confined space surrounded by buildings and obstructions must always entail some risk, not so much to life and limb, but to the aircraft itself". It continued: "As to whether the position of the site near Waterloo Station is convenient for passengers, there is again little to learn from making flights in and out".

The editorial did, however, express satisfaction that the "pilots are quite glad to have a go" and that, although the trials may only yield information of limited value, it did represent "activity, practice and another step in the education of the public in preparation for helicopter services, which it is hoped are not now many years distant". The trials continued, with John Stroud being allowed free access to capture the regular comings and goings at the South Bank site. The testing was completed on August 11, most of the flying having been undertaken by Capts Cameron and J.G. Theilmann, with Wg Cdr Brie supervising.

In October 1952 BEA published its annual report and announced the corporation's plans to acquire new premises in central London to replace its Kensington Air Station, which, according to Lord Douglas, was "bursting at the seams". After protracted negotiations with the LCC, it was decided to develop a corner of the South Bank site as a terminal — and if BEA got its way, a possible focal point for its prospective network of inter-city helicopter services. The LCC, however, made it very clear that any further trials or experimental services would be subject to further negotiation. A seven-year lease was granted and the plans for the new complex, to be known as Waterloo Air Terminal, were approved.

THE SOUND AND THE FURY

With construction of the new terminal under way, the results of the test flights of the previous summer were carefully scrutinised. At the request of a London newspaper, scientific-instrument manufacturer Dawe Instruments Ltd of Ealing

ABOVE ***An aerial view of Waterloo Air Terminal (note the BEA coaches in the parking area) and the landing area in 1955, when the airline began regular scheduled helicopter services to and from Heathrow. County Hall is at bottom right, and Stamford Street, home to*** **Flight's** ***offices, runs towards the top of the picture from the railway bridge.***

was engaged to take objective sound readings of the noise level of a BEA S-51 landing at the South Bank site in March 1953. Calibrated in decibels (dB), Dawe's instrumentation was used to take readings both inside County Hall and in the streets of the local environs. Four take-offs by the S-51 were made, with the readings in a first-floor office of County Hall reaching a maximum of 79dB during take-off, dropping to 56dB as the chopper passed overhead, before settling at the usual level of around 42dB. Dawe put this in perspective by revealing that its own offices on the first floor of a Piccadilly office building were recorded at 82dB the same afternoon with no helicopter activity, just the usual boom of traffic.

Despite these tests suggesting that noise would not present a major obstacle to the establishment of helicopter services to and from the new terminal, which was officially opened on May 19, 1953, the LCC nevertheless continued to be resistant to the idea. It stated in the autumn of 1953 that plans were afoot to build a new collection of buildings for the arts and at least one high-rise office block, intended to be the international headquarters of the Shell Petroleum Company. Interestingly, the LCC encouraged investigating the use of the roof of Waterloo train station as a potential heliport site; essentially, "get it off our front lawn and into the remit of the Railway Executive". Plans for an enormous flat roof to be put on the station were put forward, but the idea was never adopted.

By the end of 1953 the notion of a Heathrow—South Bank helicopter shuttle service was very much back on the agenda, with a route along the river being stipulated, along with float-equipped helicopters in case of ditching. By the summer of 1954 plans for such a service were gathering pace, *Flight* reporting in its June 25 issue that "the relaxation of flight restrictions for helicopters flying over London, the immediate use of the South Bank site for landings and take-offs and plans for a scheduled BEA service to London Airport next year were all part of the encouraging news which came to the notice of Londoners a week ago". The report went on to state that BEA had been authorised to buy two new Westland-Sikorsky WS-55s, which, once they had obtained their Certificates of Airworthiness, would be introduced on the service on an experimental basis. The previous week a WS-55 operated by Westland in Royal Navy colours had paid a visit to the site in a proof-of-concept trial, and the following month Belgian national airline Sabena made a demonstration flight from Brussels city centre to the South Bank in 2hr 48min with an S-55, beating BEA's Elizabethan service between Brussels and the Waterloo Air Terminal by 40min.

In May 1955 trials using BEA's WS-55 G-ANUK, looking somewhat ungainly with floats and a Vokes silencer, were performed under the supervision of Jock Cameron, with techniques being developed for the regular service, which

ABOVE ***Westland-Sikorsky WS-55 G-ANUK alights in front of County Hall in 1955. Even if all eight trips a day were full, BEA would still make a loss of £322.***

started on July 24, 1955. The aim of the service was not profitability — which was just as well, as moving only five people such a short distance was uneconomical to say the least — but rather to gain experience of helicopter operations into city-centre sites, with a view to expanding BEA's inter-city network. Indeed, the vast majority of the new service's passengers used it as an extended sightseeing opportunity rather than as a true shuttle service from Heathrow to the centre of town and vice versa.

By May 1956 the experiment had run its course and after the carriage of 3,833 passengers the service was closed, the last flight taking place on May 31. The 351ft (107m)-high Shell headquarters proposed for the site by the LCC was duly built in 1961, with the construction of the famously brutalist collection of arts buildings on the South Bank site beginning a few years later.

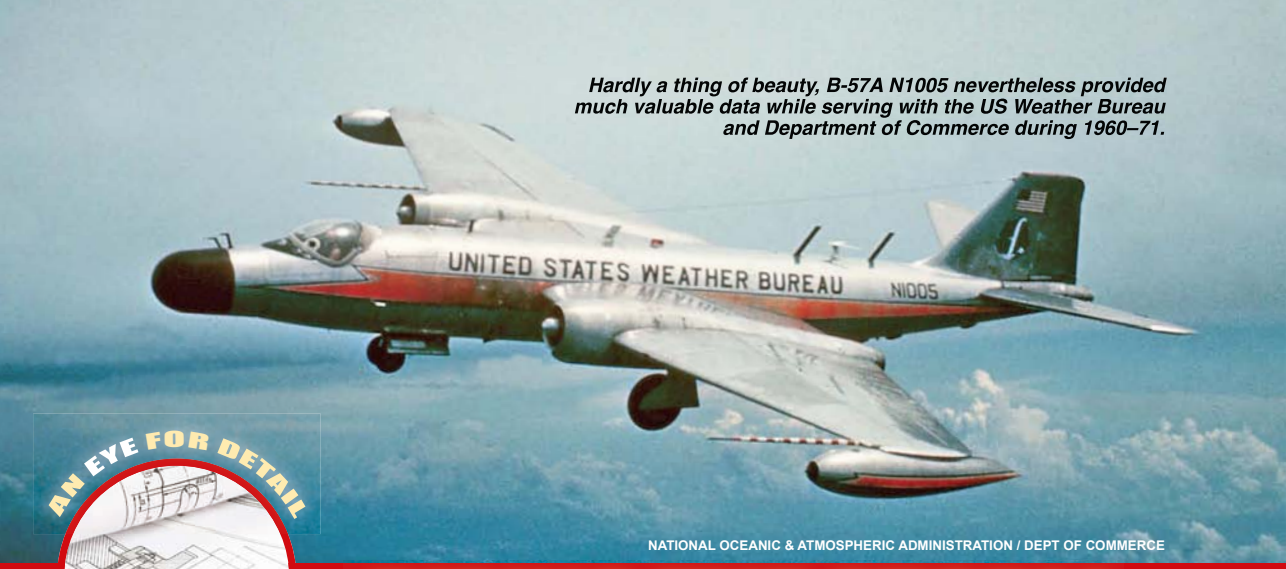
The moment for the helicopter to become as much a part of the London landscape as the red double-decker bus had passed; and, although privately-owned helicopters are still very much a regular sight over the Thames, thanks to the heliport opened at Battersea in the mid-1970s, mass helicopter use failed to materialise and revolutionise urban travel. For those 1950s BEA executives who dreamed of ever-larger helicopters delivering ever-higher numbers of passengers into the heart of the city centre, the future proved to be a letdown. **NS**

BEA's SOUTH BANK HELICOPTER SERVICE, July 1955–May 1956

BRITISH EUROPEAN AIRWAYS' experimental scheduled helicopter service between Waterloo Air Terminal and London (Heathrow) Airport began on July 24, 1955 and operated until May 31, 1956. The fares charged were £1 15s 0d per person single and £3 10s 0d per person return. Four round trips per day were operated as below:

Heathrow	Depart	1000hr	1200hr
Waterloo	Arrive	1013hr	1213hr
Waterloo	Depart	1015hr	1215hr
Heathrow	Arrive	1028hr	1228hr
Flight No		**BEH53/52**	**BEH57/56**
Heathrow	Depart	1300hr	1500hr
Waterloo	Arrive	1313hr	1513hr
Waterloo	Depart	1315hr	1515hr
Heathrow	Arrive	1328hr	1528hr
Flight No		**BEH59/58**	**BEH63/62**

ACKNOWLEDGMENTS *The Editor would like to thank Colin Higgs and Jo Ware at A Flying History Ltd (www.aflyinghistory.com) for their help with this regular series*



Hardly a thing of beauty, B-57A N1005 nevertheless provided much valuable data while serving with the US Weather Bureau and Department of Commerce during 1960–71.

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION / DEPT OF COMMERCE

RIDING THE STORM

JUANITA FRANZI continues her series, in which she takes a detailed look at some lesser-known airframes and their markings, with a rare civilian Martin B-57A "hurricane hunter"

DURING THE 1960s Miami airport in Florida was home to an unusual — and colourful — Martin B-57A. A rare example of a civilian Canberra, it was owned by the Research Flight Facility (RFF) of the US Department of Commerce (DoC) and operated as a "hurricane hunter". From its establishment in 1960 as the flight group for the US Weather Bureau's National Hurricane Research Project (NHRP), the RFF included Douglas DC-6As N6539C and N6540C and B-57A N1005. All were involved in a range of atmospheric-research projects in addition to the work of the NHRP.

The B-57A (originally USAF serial 52-1419) was the second of only eight B-57As built, and had been used for stability trials at Edwards Air Force Base in California. In 1960, after being fitted with a radar nose, it was signed over to the DoC and fitted with specialised instrumentation.

In 1965 the US Weather Bureau came under the DoC's newly formed Environmental Science Services Administration (ESSA), and the RFF was placed under ESSA's direct control. The latter inherited the NHRP — renamed the National Hurricane Research Laboratory (NHRL) — as well as the controversial Project *Stormfury*. Inspired by the "cloud-seeding" experiments of the 1950s, the project had been established in 1962 as a joint venture between the DoC and the US Navy.

The American government could see value in funding a project which, by possibly reducing reducing the severity of hurricanes, could lower the damage and cost wrought on the community. *Stormfury* continued under ESSA's stewardship, around 12 aircraft — including the RFF fleet — waiting in readiness for a suitable hurricane to study during August—October. It was not until 1969 that a hurricane of sufficient strength arrived in the research area. Hurricane *Debbie* finally gave researchers the opportunity to test the techniques developed over the previous four years.

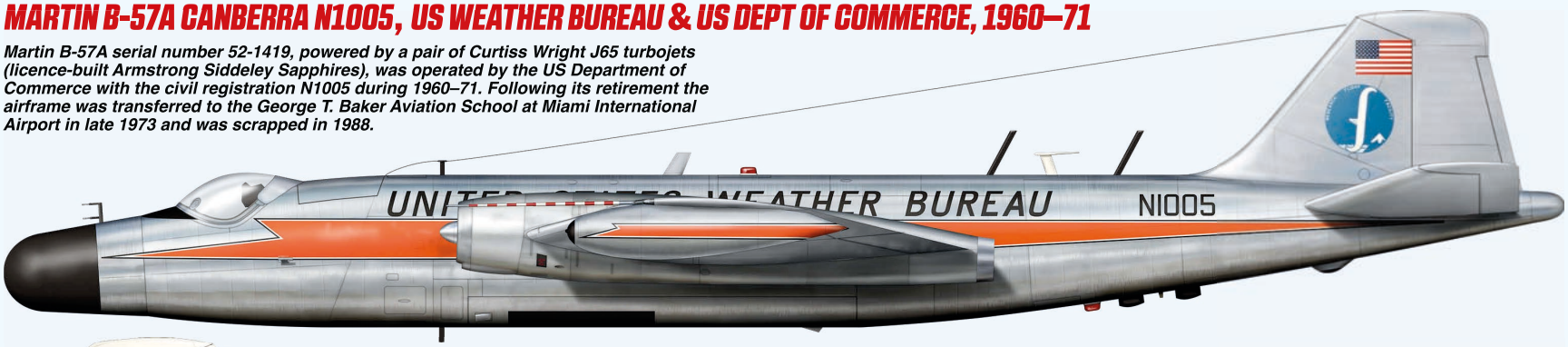
The B-57A was used to gather vital data in the upper reaches of a hurricane. The Canberra's 43,000ft (13,100m) operational ceiling was some 20,000ft (6,100m) higher than that of the DC-6A and the former's bomb bay offered a spacious area for instrumentation. With a crew capacity of only two, the type was not without its drawbacks, however, the navigator having to double as the science officer. Oddly, neither the aircraft nor its bomb bay were fitted with de-icing equipment, which limited the conditions under which it could fly, the severe cold at altitude leading to research instrument failures.

As legislation resulting from concerns about weather modification moved the hurricane-research area further away from land, the range and duration of the B-57A became a significant operational factor. Late 1970 brought another restructure and the end of ESSA. The oversight of scientific research was thus handed over to the newly-established National Oceanic & Atmospheric Administration (NOAA) and the B-57A was repainted in the latter's blue-and-white colour scheme. Barely a year later it was retired.

Stormfury operations continued for a few more years but, ironically, data collected during hurricanes such as *Debbie* indicated that seeding was largely ineffective. With that realisation *Stormfury* was brought to an end.

MARTIN B-57A CANBERRA N1005, US WEATHER BUREAU & US DEPT OF COMMERCE, 1960–71

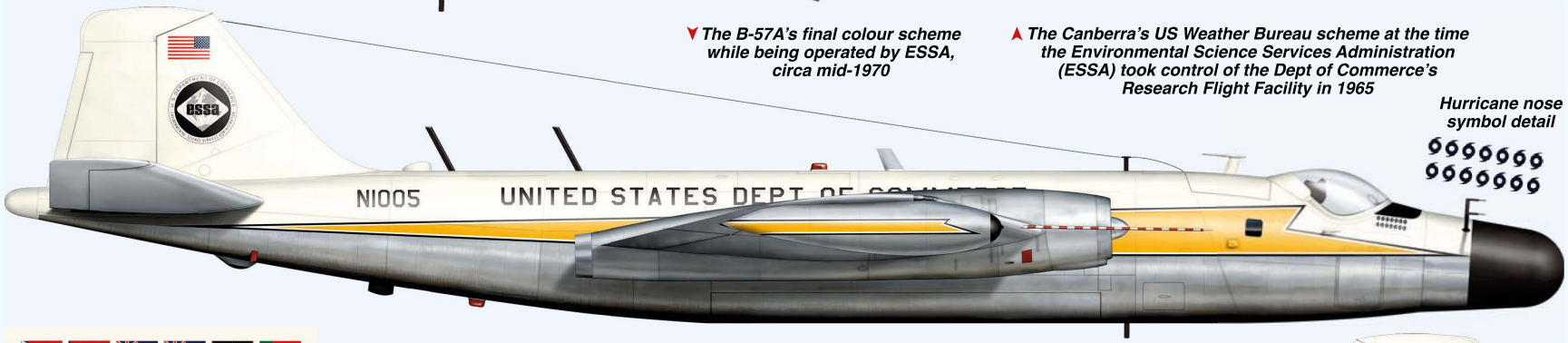
Martin B-57A serial number 52-1419, powered by a pair of Curtiss Wright J65 turbojets (licence-built Armstrong Siddeley Sapphires), was operated by the US Department of Commerce with the civil registration N1005 during 1960–71. Following its retirement the airframe was transferred to the George T. Baker Aviation School at Miami International Airport in late 1973 and was scrapped in 1988.



The B-57A's final colour scheme while being operated by ESSA, circa mid-1970

The Canberra's US Weather Bureau scheme at the time the Environmental Science Services Administration (ESSA) took control of the Dept of Commerce's Research Flight Facility in 1965

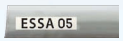
Hurricane nose symbol detail



Port side artwork: flags representing overseas locations from which N1005 had operated

Wings remained unpainted throughout DoC service

Nosewheel door



Small seeding pipes fitted to top and bottom of both wings

A HARD RAIN

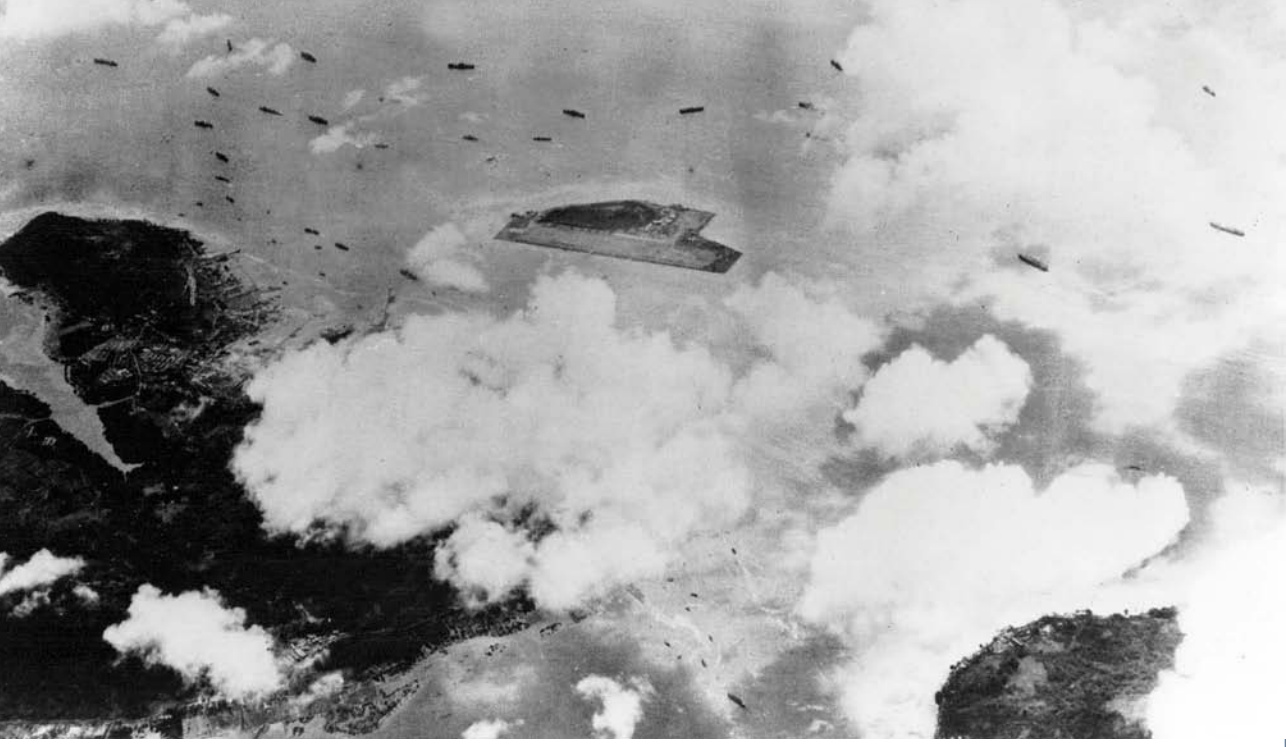
OPERATION HAILSTONE : THE US NAVY RAID ON TRUK LAGOON, FEBRUARY 17–18, 1944

Using official documents from the US Navy archives and other contemporary sources, **EDWARD M. YOUNG** provides a blow-by-blow account of the American action in the Caroline Islands over two days in February 1944 that revolutionised naval air warfare, proving the Fast Carrier Task Force's ability to take the battle to the heart of the enemy

TRUK. MENTION of this Imperial Japanese Navy base in the Central Pacific's Caroline Islands stirred no little trepidation in the hearts and minds of many US Navy carrier aviators in early 1944. Shrouded in secrecy for more than a decade, rumoured to have been built into an impregnable fortress and anchorage for the Imperial Japanese Navy's Combined Fleet, Truk had acquired a reputation as the "Gibraltar of the Pacific", a veritable hornet's nest. Because of its strategic importance, in early February 1944 planners in the American Pacific Fleet turned their eyes on Truk as the next target for the Navy's Fast Carrier Task Force, TF 58, under the command of Rear Admiral Marc Mitscher.

America's War Plan Orange, the pre-war planning document outlining a strategy in the event of a war between the USA and Japan, envisioned an American march across the Central Pacific capturing island bases in the Gilberts and the Marshalls on the way to the Philippines, and an

The snarling Pratt & Whitney Double Wasp engines of the Grumman F6F Hellcats of US Navy squadron VF-10 were captured by an official war photographer as the fighters returned to the* USS Enterprise *after escorting an Air Group Ten strike on Truk during Operation* Hailstone*, one of the most significant air operations of the Pacific War. Eugene Valencia, a pilot with Hellcat unit VF-9, said on his return from a raid on Truk: "Those Grummans are beautiful aeroplanes; if they could cook I'd marry one!"



ROBERT LAWSON COLLECTION, NATIONAL NAVAL AVIATION MUSEUM

ABOVE ***A southerly-facing photograph taken by one of the two Consolidated PB4Y-1s sent from Bougainville to photograph Truk on February 4, 1944. The curiously angular Eten Island and its airfield are clearly visible in the upper centre of the photograph, with the south-eastern corner of the much larger Dublon to the picture's left.***

eventual blockade of Japan. By the summer of 1943 the US Navy had replaced its carriers lost in battle during 1942 with the newer *Essex*-class fleet carriers and the smaller *Independence*-class light carriers, and the air groups to man them. After "shakedown" strikes against Wake and Marcus Island, the Fast Carrier Task Force supported the invasion of the Gilbert Islands (Operation *Galvanic*) in November 1943 with the capture of Makin and Tarawa. The next target was the Marshall Islands (Operation *Flintlock*). The Navy's carrier force, now designated Task Force 58 under the command of Mitscher, began strikes against Kwajalein, Roi-Namur, Eniwetok and other Japanese bases in the Marshalls on January 29, 1944, three days before US Army and Marine Corps troops landed on Kwajalein. The latter fell on February 4, faster than expected.

THE NEED TO NEUTRALISE TRUK

The speed of the victory encouraged Admiral Chester Nimitz, Commander in Chief, Pacific Command (CINCPAC), to advance the timetable for follow-on operations. He proposed to Adm Raymond Spruance, Commander in Chief, Central Pacific Force (including TF 58), that American amphibious forces move quickly to seize Eniwetok, and at the same time launch a carrier strike on Truk to inflict severe damage on the base and prevent the Japanese from interfering with the Eniwetok operation. The date for both operations to begin was set for February 17.

The US Navy lacked intelligence about Japanese defences and forces at Truk. On February 4 two US Marine Corps (USMC) Consolidated PB4Y-1s of VMD-254, flying out of Bougainville, made a high-altitude photo-run over Truk. Although the islands were partly covered in cloud, the aircraft obtained good coverage of most installations and photos of ships of the Japanese Combined Fleet and a large number of transports in Truk Lagoon.

In developing his plan for the carrier strike, Mitscher introduced a new technique; the strike would begin with a dawn fighter sweep over the Japanese bases with 72 Grumman F6F Hellcats to knock out enemy air opposition before the slower dive- and torpedo-bombers came in to strike installations and shipping in the lagoon.

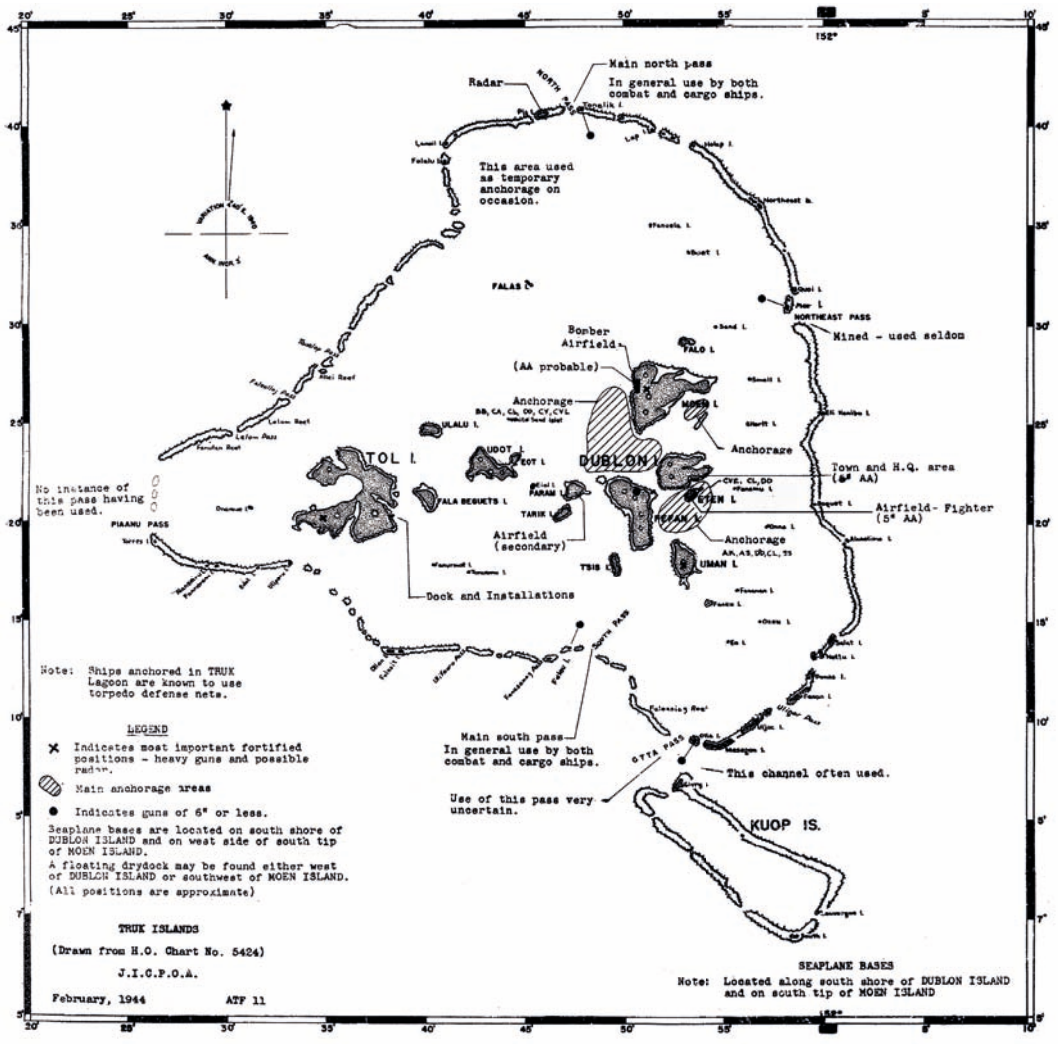
The operational plan for the first day of the attack called for a series of six strikes against Truk following the fighter sweep, labelled A to F, with each strike set 2hr apart to blanket Truk Lagoon during the entire day. The three Task Groups would send in their strike forces at 15min intervals, and each was assigned a specific anchorage to avoid duplication of attacks. When TF 58 was under way, the aircrews found out where they were headed. Commanding Air Group Nine on the *USS Essex*, Lt-Cdr Philip Torrey later said, "they announced our destination over the loudspeaker. It was Truk. My first instinct was to jump overboard".

The photo-reconnaissance of Truk prompted *Kaigun taishō* (Admiral) Mineichi Koga, commander of the Combined Fleet, to order its withdrawal to Palau, leaving two light cruisers,

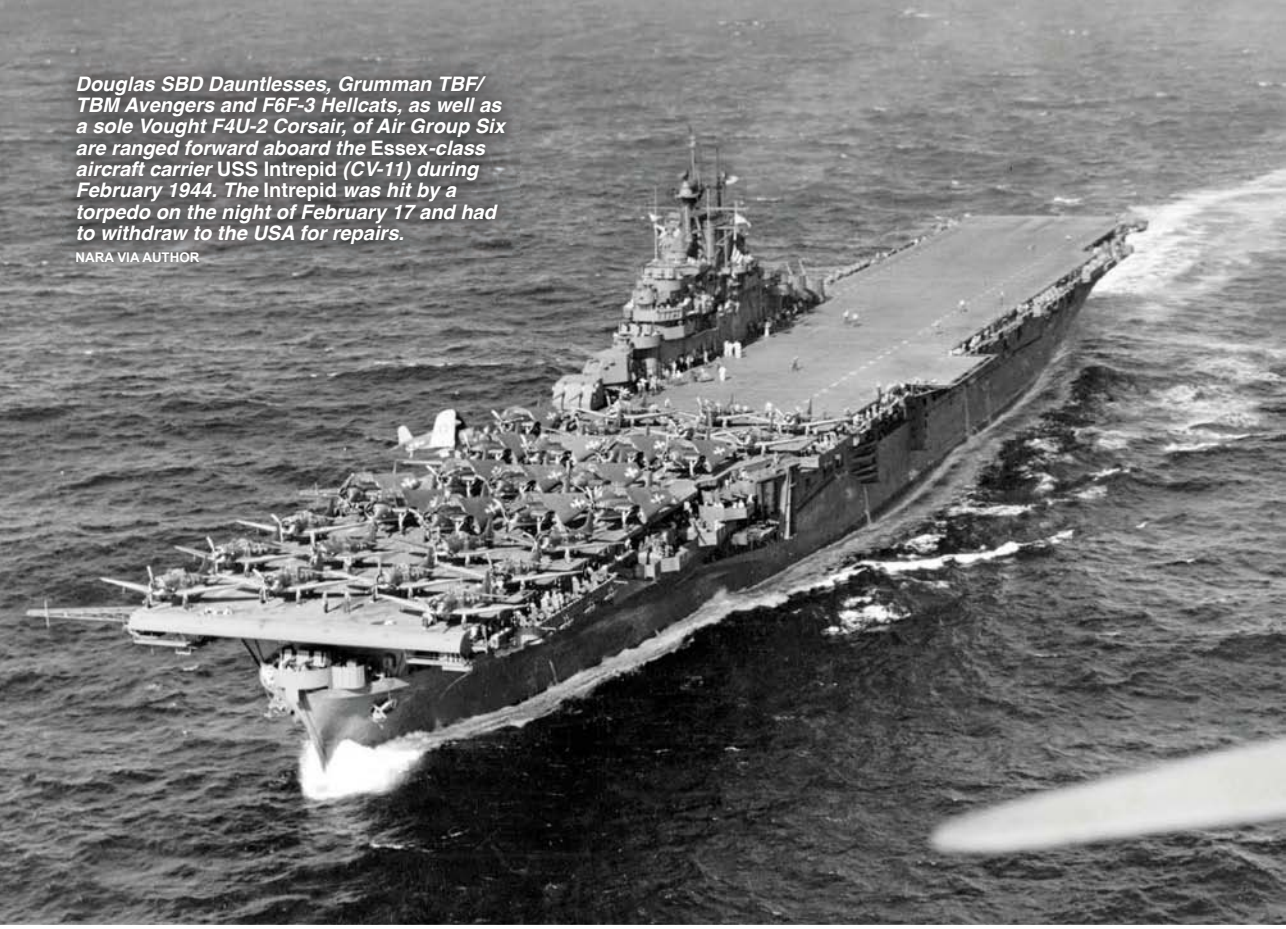
TRUK LAGOON : JAPAN'S IMPREGNABLE PACIFIC FORTRESS?

LOCATED 1,120 MILES (1,800km) north-east of New Guinea, Truk Lagoon comprises 11 major islands surrounded by a reef 140 miles (225km) in circumference. Within this reef lies one of the best natural anchorages in the world, large enough to contain the Imperial Japanese Navy's (IJN) wartime Combined Fleet. Now part of the Federated States of Micronesia, Truk lay at the centre of the Japanese Mandated Islands, with Saipan to the north controlling the Marianas and Kwajalein to the east controlling the Marshall Islands, making the lagoon a natural base for the protection of these Japanese territories.

After Japanese forces captured positions in the Bismarck Archipelago and the Solomon Islands to extend Japan's defensive perimeter, Truk became an important staging post for war materiel destined for the South Pacific, and the base for the Combined Fleet from July 1942. By 1944 the IJN had built a seaplane base on Dublon and airfields on Moen, Eten, and Param, with another combined airfield and seaplane base on Moen. Replacement air units and aircraft used these bases for stopovers on their way to Rabaul. From Truk the IJN could also reinforce its bases in the Marshall Islands or the Marianas. **EMY**



ABOVE ***This official US Navy map of Truk Lagoon, marked with airfields, anchorages, minefields and radar installations, was created from the photographs taken by the US Marine Corps PB4Y-1s during their missions over Truk on February 4, 1944. A copy was given to all the aircrews participating in Operation*** **Hailstone.**



Douglas SBD Dauntlesses, Grumman TBF/TBM Avengers and F6F-3 Hellcats, as well as a sole Vought F4U-2 Corsair, of Air Group Six are ranged forward aboard the* Essex*-class aircraft carrier* USS Intrepid *(CV-11) during February 1944. The* Intrepid *was hit by a torpedo on the night of February 17 and had to withdraw to the USA for repairs.
NARA VIA AUTHOR

eight destroyers, and a number of auxiliary vessels. Fortuitously for the Americans, a large number of transports remained at Truk, as did upwards of 200 replacement aircraft awaiting pilots to ferry them south. These aircraft were parked close together on the packed airfields.

The Imperial Japanese Navy Air Force (IJNAF) had assigned the defence of Truk to the 26th *Kōkū Sentai* (Air Flotilla), which comprised the Mitsubishi A6M Zero fighters of the 201st, 204th and 501st *Kōkūtai* (Air Groups). The 4th *Konkyochitai* (Naval Base Force) incorporated the 902nd Kōkūtai with Mitsubishi F1M2 Type Zero Observation/Reconnaissance Seaplanes (Allied reporting name *Pete*) and Nakajima A6M2-N Navy Type 2 Floatplane Fighters (*Rufe*). There were also a number of other air units with land-based and carrier attack bombers, seaplanes and floatplanes. In total, on the day of the first carrier strike there were an estimated 365 Japanese aircraft on Truk's airfields and seaplane bases.

INTO ACTION

Coming in from the north-east, TF 58 began launching the fighter sweep a little over an hour before dawn on February 17, 1944. While the fighter squadrons on the light carriers stayed to provide combat air patrols (CAPs) over the Task Force, the larger fleet carriers sent their Hellcats off to Truk, with the fighters from each Task Group assigned a specific altitude: 12 Hellcats from VF-10 and 12 from VF-5 went in at low level; VF-6 sent off 12 Hellcats and VF-9 sent off 11 to cover the medium altitudes, and VF-18 assigned 22 Hellcats to provide top cover at 25,000ft (7,620m). Launching in the pre-dawn darkness, the squadrons climbed to their assigned altitudes as they neared Truk Lagoon.

Japanese radar picked up the approaching carrier fighters about 30min before they reached the lagoon, but there was a delay in getting out an alarm to units on the three airfields. Not all the defending fighters got off in time. As Japanese fighters rose from Parem, Eten and Moen airfields, American Hellcats appeared overhead.

Lieutenant-Commander William "Killer" Kane, Air Group 10 commander and flight leader of the fighter sweep, brought the Hellcats of VF-10 in at 8,000ft (2,400m). He saw four Zero fighters (Allied reporting name *Zeke*) approaching from his right. The *Zekes* made a poorly executed pass against Kane and his wingman, Lt (jg) Vernon Ude, each shooting one down. Ude went after a third *Zeke* flying with one mainwheel down and set it on fire. Kane then led his wingman down to strafe Eten airfield, firing at two fighters he identified as *Tojos*, the Allied reporting name for the Imperial Japanese Army Air Force's (IJAAF) Nakajima

TASK FORCE 58 AND OPERATION *HAILSTONE*, FEB 17–18, 1944

FOR THE STRIKE against Truk, Task Force 58 marshalled three of its four Task Groups, organised as follows:

TASK GROUP 58.1

***USS Enterprise* (CV-6) / Air Group Ten**
Units: VF-10 (32 x Grumman F6F-3); VB-10 (30 x Douglas SBD-5); VT-10 (18 x Grumman TBF-1); VF(N)-101, Detachment A (4 x Vought F4U-2)

***USS Yorktown* (CV-10) / Air Group Five**
Units: VF-5 (36 x F6F-3); VB-5 (36 x SBD-5); VT-5 (18 x TBF-1); VF(N)-76, Detachment B (4 x F6F-3N)

***USS Belleau Wood* (CVL-24) / Air Group 24**
Units: VF-24 (26 x F6F-3); VF-6 (12 x F6F-3); VC-22B (8 x TBF-1)

TASK GROUP 58.2

***USS Essex* (CV-9) / Air Group Nine**
Units: VF-9 (36 x F6F-3); VB-9 (36 x SBD-5); VT-9 (17 x TBF-1, 2 x General Motors TBM-1 Avengers)

***USS Intrepid* (CV-11) / Air Group Six**
Units: VF-6 (36 x F6F-3); VB-6 (36 x SBD-5); VT-6 (14 x TBF-1, 5 x TBM-1); VF(N)-101, Detachment B (4 x F4U-2)

***USS Cabot* (CVL-28) / Air Group 31**
Units: VF-31 (26 x F6F-3); VT-31 (8 x TBM-1C, 1 x TBF-1)

TASK GROUP 58.3

***USS Bunker Hill* (CV-17) / Air Group 17**
Units: VF-18 (37 x F6F-3); VB-17 (31 x Curtiss SB2C-1); VT-17 (19 x TBF-1, 1 x TBM-1); VF(N)-76, Detachment A (4 x F6F-3N)

***USS Monterey* (CVL-26) / Air Group 30**
Units: VF-30 (25 x F6F-3); VT-30 (5 x TBF-1, 4 x TBM-1)

***USS Cowpens* (CVL-25) / Air Group 25**
Units: VF-25 (24 x F6F-3); VT-25 (9 x TBF-1)

TF 58's fourth Task Group, TG 58.4, was assigned to support Operation *Flintlock*, the landings on Eniwetok during February 17–23, 1944.

Source: Morrison, S.E.: *History of United States Naval Operations in World War II Volume 7: Aleutians, Gilberts and Marshalls, June 1942–April 1944 (Little, Brown & Co)*

Ki-44 Shoki, as they were taking off, sending both down in flames. The pilots of VF-10 quickly became embroiled in a dogfight with formations of *Zekes* and *Rufes* that had managed to get off and climb to altitude before the attack began. Finding himself behind a *Zeke*, Lt (jg) Joseph "Frenchy" Reulet promptly shot it down before going after a *Rufe*, which pulled up into a loop to evade him. Reulet followed and fired just before his Hellcat stalled, sending the *Rufe* down in flames.

Reulet got his third kill of the morning when he shot down a Mitsubishi A6M3 Model 32 (a Zero modified with square wingtips, Allied reporting name *Hamp*) that was attacking another Hellcat. One pilot, Ens Linton Cox, was lost by VF-10 during the fighter sweep, probably to fire from a *Rufe*. In total VF-10's pilots claimed 14 Japanese aircraft shot down and a further five destroyed in the strafing attack on Eten.

On reaching Truk eight of VF-5's Hellcats went down to strafe the seaplane base at Dublon, while four remained above to cover them. The strafers claimed five flying-boats — three Kawanishi H6Ks (Allied reporting name *Mavis*) and two Kawanishi H8Ks (*Emily*) — as destroyed before they became involved in the developing mêlée. The Hellcat squadrons reported that they ran into between 20–30 *Zekes* and *Hamps* over Truk, 6–8 *Rufes*, 6–8 *Petes* and 6–8 Nakajima B5N *Kates*. The VF-5 pilots claimed three *Zekes*, three *Rufes* and a single *Pete* for the loss of one Hellcat to anti-aircraft fire.

TUMULT IN THE CLOUDS

After making their rendezvous the Hellcats of VF-6 and VF-9 flew towards Truk at 1,000ft (300m). Around 15min before they reached the lagoon they climbed to 14,000ft (4,300m), observing the Hellcats of VF-5 and VF-10 below them. The two squadrons headed toward the airfield on Moen Island. As ten aircraft from VF-6 spiralled down to begin their strafing runs, Lt (jg) Alexander Vraciu and his wingman Ens Louis Little spotted a formation of *Zekes* above them that had taken off in time to climb to altitude.

Vraciu and Little turned in to the attack, forcing the leader of the Japanese formation to break off. As Vraciu reported later, "We noticed that the Jap pilots weren't reluctant to attack, but once they were cornered they'd dive steeply for the water or cloud cover. The Hellcat can outmanœuvre the Zero at speeds of 250kt and better so we began to follow them down. I was able to follow three 'planes down in this manner, two being Zeroes and one a *Rufe*, and set them afire". Vraciu got one more *Zeke* dodging in and out of cloud. Another VF-6 pilot, Lt (jg) Cyrus Chambers, claimed three fighters shot down and a probable on a fourth,

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ABOVE ***A Mitsubishi A6M Zero (Allied reporting name* Zeke*) is caught in the gunsight of a US Navy Hellcat during the fighter sweep over Truk on the first morning of Operation* Hailstone. **LEFT** ***Lieutenant (junior grade) Alex Vraciu proudly displays nine rising-sun emblems on his F6F Hellcat, each depicting an aerial victory, including three* Zekes *and a* Rufe *floatplane fighter downed during operations over Truk.***

almost equalling Vraciu's score. In strafing runs against the airfields on Moen and Parem Islands VF-6 claimed 24 aircraft destroyed to add to the claims of 11 in the air for the loss of one pilot, again to anti-aircraft fire.

Returning from the fighter sweep with the highest score against the Japanese, VF-9's three divisions had each fought a separate battle. The unit's assigned mission was to provide cover for the squadrons at lower altitude, with the secondary mission of strafing the airfields on Parem and Moen. As the three divisions arrived over the target area separately, Japanese fighters bounced the squadron's third division consisting of Lt Charles Moutenot and Lts (jg) Bill Bonneau and Eugene Valencia. Breaking away in violent evasive action, the three pilots became caught up in their own dogfights, Moutenot claiming one of his attackers and Bonneau dispatching a *Zeke* and three *Rufes*. Valencia dived from 14,000ft to low over the water with 6–8 *Zekes* bracketing his Hellcat. Two of the *Zekes* pulled up ahead of him and he shot them both down. Turning into two more of his attackers, he shot down the leader and headed for home.

At about the same time, VF-9's second division became embroiled in a series of dogfights lasting some 30min. Outnumbered, the division had a stiff fight against several formations of *Zekes*, losing one pilot, Lt (jg) H.A. Schiebler, who may have been shot down in error by another Hellcat. Violent evasive action and cloud cover broke up the division into sections, and the sections into individual fighters, even though their training stressed the necessity of never flying alone.

Leading the division, Lt Jack Kitchen shot down a *Rufe* in a head-on attack shortly before firing a long burst into a *Zeke,* which went down in a dive, although Kitchen did not see it crash. Ensign John Franks, Kitchen's wingman, became separated and, under attack from a *Zeke* coming in from above, dived to gain speed before pulling up while dropping his flaps to turn inside the *Zeke*. As the Japanese fighter flew past, Franks fired and the *Zeke* exploded. Climbing back up, Franks encountered a single *Pete* and shot this down, the pilot and observer baling out. Franks's third kill came in a head-on run against a *Zeke*, which burst into flames, the pilot taking to the silk.

The commander of VF-9, Lt-Cdr Herbert Houck, was leading the first division, which did not come under attack. Seeing the other Hellcat squadrons dealing successfully with the Japanese fighters, Houck led his division down in a strafing attack on Moen airfield and seaplane base. In five successive runs, the four fighters set 10–12 aircraft on fire before moving on to the airfield on Parem Island, where the division set fire to another 15 aircraft in five runs across the field.

The pilots caught several aircraft taking off from both fields. Houck claimed a *Pete* taking off from Moen seaplane base and a *Kate* taking off from Parem. Two *Petes* were shot down over Moen and two *Kates* over Parem by Lt (jg) Louis Menard. In total, VF-9 claimed 21 aircraft shot down in the air and another 25–27 destroyed on the ground. Flying top cover, VF-18 missed most of the fighting, claiming only one *Zeke* destroyed and another as a probable.

ENTER THE BOMBERS

Hard on the heels of the fighter sweep came the first strikes against shipping in the lagoon and the airfields. The strike forces from the three

IMPERIAL JAPANESE NAVY AIR FORCE UNITS ON TRUK

THE FOLLOWING IMPERIAL Japanese Navy Air Force (IJNAF) units were on Truk during February 1944:

4th *Konkyochitai* (Naval Base Force)
Units: 902nd *Kōkūtai* (25 x Aichi E13A Navy Type 0 Reconnaissance Seaplane, Allied reporting name *Jake*, unknown numbers of Nakajima A6M2-N Navy Type 2 Seaplane Fighters, reporting name *Rufe,* and Mitsubishi F1M Navy Type 0 Observation Seaplanes, reporting name *Pete*)

22nd *Kōkū Sentai* (Air Flotilla)
Units: 755th Kōkūtai (8 x Mitsubishi G4M Navy Type 1 Attack Bomber, reporting name *Betty*); 552nd Kōkūtai (15 x Nakajima B5N2 Navy Type 97-3 Carrier Attack Bomber, reporting name *Kate)*

26th Kōkū Sentai
Units: 204th Kōkūtai (31 x Mitsubishi A6M Navy Type 0 Carrier Fighter)*; 201st Kōkūtai (8 x Mitsubishi A6M Navy Type 0 Carrier Fighter); 501st Kōkūtai (25 x Mitsubishi A6M Navy Type 0 Carrier Fighter); 251st Kōkūtai (9 x Nakajima J1N1-S Navy Nightfighter, reporting name *Irving*); 582nd Kōkūtai (10 x Nakajima B6N1 *Jill)*

23rd Kōkū Sentai
Units: 753rd Kōkūtai (10 x Mitsubishi G4M *Betty)*

28th Kōkū Sentai
Units: 551st Kōkūtai (14 x Nakajima B6N1 *Jill)*

* Allied reporting name *Zeke*, except for Model 32 variants, reporting name *Hamp*

Source: Lindemann, Klaus: *Hailstorm Over Truk Lagoon* (Pacific Press/Maruzen, 1991)

Task Groups, composed of dive- and torpedo-bombers with an escort of Hellcats, arrived over Truk at 15min intervals. Air Group Ten from the *USS Enterprise* and Air Group Five from the *USS Yorktown* went in first, followed by Air Group Nine from the *USS Essex* and Air Group Six from the *USS Intrepid*, with Air Group 17 from the *USS Bunker Hill* coming in last.

While the divebombers and most of the torpedo-bombers went after shipping, seven Grumman TBF Avengers from VT-10 dropped fragmentation bombs and incendiary clusters on the airfield at Eten, then went down to strafe the aircraft lined up on the field. Fifteen minutes later nine TBFs from VT-6 came in to do the same on Moen seaplane base, reporting one *Mavis* and 13 *Rufes* destroyed in the attack. Winds interfered with the bombing, but, while none of the ships attacked sank outright, the Avengers, Douglas SBD Dauntlesses and Curtiss SB2C Helldivers scored many hits on freighters, tankers and naval vessels, leaving a number smoking and on fire. This first strike cost TF 58 one SBD from VB-6 and one SB2C from VB-17.

The escorting Hellcats ran into several formations of Zeroes. Pulling up from a strafing run with the Avengers over Eten field, Lt (jg) Walter Harmon of VF-10 saw a Zero below him and with a 2sec burst at 30° deflection hit its engine, sending the Japanese fighter diving down into the water. Harmon damaged a second Zero, then caught a third after a 7min chase. Coming in from directly astern, Harmon saw the Zero's engine explode under his fire and the Japanese fighter slamming into the water. Harmon then caught a *Rufe* taking off and shot it down with a single burst. Other VF-10 pilots claimed five more aircraft destroyed, VF-6 adding another three.

A Hellcat of VF-9 prepares to launch from the* USS Essex *to escort Air Group Nine's Dauntlesses and Avengers to Truk. Hellcat pilots reported that at speeds above 200kt the F6F could match the Zero in manœuvrability and that, when hit, the Japanese aircraft burned quickly.
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ABOVE ***Two VF-10 Hellcat pilots head back to the ready-room after returning from a mission over Truk. The unit was activated in June 1942 with Grumman F4F Wildcats, and completed its first combat tour aboard the*** **Enterprise** ***at Guadalcanal during 1942–43. Re-equipping with F6Fs, the unit rejoined the ship and sailed for the South Pacific.***

The second strike series began 1hr 15min later, the Air Groups again coming in over the lagoon at 15min intervals. The TBFs of VT-10 went after the light cruiser *Katori* and the destroyer *Maikaze,* both trying to escape Truk Lagoon, scoring hits on both. Other freighters and tankers in the lagoon came under continued attack. The Dauntlesses of VB-10 scored hits on a 19,200-ton converted whaling ship, two 1,000lb (455kg) bombs blowing up the ship's stern and leaving it sinking, at the cost of one SBD lost to flak.

STIFFENING RESISTANCE

More Zeroes got off from the damaged airfields and went after the attackers. The second division of VB-10 came under attack from four Zeroes and a *Rufe*. The Japanese fighters concentrated on Ens Bob Wilson's SBD, his gunner Howard Honea claiming one *Zeke* shot down and another damaged before Wilson could get his damaged Dauntless into nearby clouds to escape.

One of VF-10's divisions had a stiff battle with a formation of determined Zeroes that lasted 20min, Lts (jg) Peter Shonk and John Shinneman, with Ensigns John Kincaid and Perrault, taking on three *Zekes* in a head-on attack. Shonk damaged one as it flew past and, as the remaining two Japanese fighters turned back to fight, three more *Zekes* joined the fight. Shinneman shot a *Zeke* off Perrault's tail and sent it down smoking. Kincaid then shot a *Zeke* off Shinneman's tail. Shonk, Shinneman and Kincaid managed to damage one *Zeke* each but all three returned to the *Enterprise* with their Hellcats shot up, lucky to have survived.

Commanding Air Group Nine, Philip Torrey led a formation from the *Essex* and *Intrepid*. Air Group Nine sent out 14 VF-9 Hellcats to escort nine TBFs of VT-9 and 12 SBDs from VB-9, while Air Group Six sent out the same number of aircraft from VF-6, VB-6 and VT-6. As the bombers approached the lagoon, Torrey scouted ahead to locate targets for the bombers. Seeing that most of the Japanese ships were near Dublon, he sent VB-9, VT-9 and VT-6 to attack shipping and ordered VB-6 and three aircraft from VT-6 to bomb the seaplane base at Moen and the airfield on Eten.

The Avengers and Dauntlesses split up into small groups of three and six aircraft to attack the ships below. As they began their attacks, the bombers could see some 15–20 Japanese fighters in the air over the islands. Torrey led his division of Hellcats down with the bombers to strafe the ships, but just as the bombers began their dives Lt A.B. Smith, leading the second element of Torrey's division, saw tracers fly past his fighter. He threw his aircraft into a skid and chopped the throttle. His Japanese attacker pulled up into a steep climb. Smith had no trouble following the Zero, getting in a burst that set the Zero's wing on fire, sending it spinning down into the lagoon. Seeing two Zeroes taking off from Moen airfield, Smith went after them and shot both down. Returning to the *Essex,* Smith ran out of gas and had to ditch, but a destroyer rescued him.

The Zero that attacked Smith was one of around

NARA VIA AUTHOR

ABOVE ***Even in the heat of battle the US Navy made sure official war photographers were on hand to document the action. One of numerous excellent images captured during the raid on Truk, this example shows a deck handler directing forward a VB-10 Dauntless with a 500lb bomb under the fuselage, for launch from the*** **Enterprise.**

15 *Zekes* and *Hamps* that the VF-9 pilots saw flying at 10,000ft (3,050m) and 3,000ft (915m). Leading the second division, Lt Mike Hadden had dived down to strafe with his wingman, Ens Lewis Matthews, not having seen the approaching Japanese fighters. As he pulled up from his strafing run, Hadden and Matthews came under attack from a single Zero, but turned in to the attack, forcing the Zero to break off and head into cloud. The pair went in pursuit, coming in behind the Zero as it emerged. The Zero pulled up in a loop, Hadden getting in a good burst as it reached the top. Undeterred, the Zero pilot attempted to come in behind the two Hellcats, but Hadden outmanœuvred the Japanese pilot and sent him down in flames. Continuing to fly around the area, Hadden attacked and shot down two more Zeroes, as did Matthews.

Leading Hadden's second element, Lt (jg) Hamilton McWhorter saw three *Zekes* off to his left just as he was about to follow Hadden down in a strafing attack. Instead, he turned into the Japanese fighters. The first *Zeke* in the formation flew past him. McWhorter fired on the second, causing the engine to burst into flames and the pilot to bale out. He fired on the third *Zeke* as it came at him and shot this fighter down as well.

McWhorter's wingman, Lt (jg) Bill Gehoe, was in a perfect position as the first *Zeke* flew past McWhorter. Firing head-on, Gehoe saw the *Zeke* start to smoke and explode in front of him. Gehoe then found himself in a head-on attack on a second *Zeke*, and again opened fire, the Japanese fighter exploding almost immediately. Shortly thereafter McWhorter closed on a *Hamp* making a climbing turn to port ahead of him. Opening fire from the port quarter, McWhorter saw the *Hamp* begin to smoke and then start a "Split-S". McWhorter followed, getting off several more bursts that set the *Hamp* on fire, the Japanese pilot baling out into the lagoon below.

MEANWHILE . . .

Air Group Nine's SBDs attacked a destroyer and a large freighter near Dublon, getting hits on both. The TBFs of VT-9 had better luck, claiming two ships sunk and two more severely damaged in bombing attacks. Three VT-6 TBMs (General Motors-built Avengers) dropped 2,000lb (900kg) bombs on Eten Island's airfield, while the others went after shipping with 500lb (225kg) bombs. Lieutenant James E. Bridges was lost when he dodged anti-aircraft fire to make a successful run on a freighter that proved to be an ammunition ship, which exploded just as Bridges passed over. *Zekes* attacked another VT-6 TBM that ditched outside the lagoon, the crew being rescued.

The SBDs of VB-6 attacked the seaplane base and a large freighter, getting hits on the freighter and destroying four aircraft at the seaplane base. Hellcat pilots Lts (jg) Herschel Pahl and Wilton Hutt of VF-6 each claimed a *Zeke* shot down, but other Japanese fighters attacked the SBD formation and shot down one of the Dauntlesses.

Taking off 15min after Air Group Six and Air Group Nine, Air Group 17 followed with 17

Helldivers and nine TBMs with an escort of four Hellcats from VF-18 and 17 from VF-25 from the *USS Cowpens*. The TBMs and two of the SB2Cs attacked the *Katori*, getting more hits and slowing the light cruiser down to a crawl. The rest of the Helldivers scored hits on a freighter.

The third and fourth strikes of the day went in late in the morning and shortly after noon. The Air Groups directed most of their efforts at hitting vessels trying to leave Truk Lagoon via the North Pass, the *Katori* and *Maikaze* coming under repeated pounding. On these strikes many of the Avengers carried torpedoes, VT-9 scoring three hits amidships on the *Katori*, stopping it dead in the water. In contrast, VB-9's SBDs failed to damage the *Maikaze*, getting only near misses. On the fourth strike the SBDs of VB-6 hit the *Maikaze* in the bow, bringing the destroyer to a halt. The accompanying Hellcats made repeated strafing runs on the damaged ships and shortly afterwards American ships sank both with gunfire.

Anti-aircraft fire over the lagoon was still heavy, claiming two bombers from the *Intrepid* during the third strike, but in the middle of the day Japanese air resistance was sporadic. The Zero units had suffered heavily in the early-morning fighter sweep and the airfields on Eten and Moen remained under attack at regular intervals.

Some Zeroes were able to put up some resistance in the afternoon (see *Avenger vs Zero* panel on page 87), and one of them may have claimed the life of Lt-Cdr John Philips, commander of Air Group Six, and his wingman, Ens John Ogg. Philips was flying a Hellcat as Target Observer, directing and co-ordinating the attacks of the Air Group's dive- and torpedo-bombers. He and Ogg failed to return from the third strike and were listed as missing in action.

MAINTAINING THE PRESSURE

During the fifth strike of the day the bombers concentrated mostly on shipping in and around the anchorages near Dublon, Fefan, Eten, Uman and Moen islands and the airfield on Parem Island. The bombers scored hits on numerous ships, leaving a tanker burning and several freighters on fire. The Hellcats of VF-10 strafed Parem airfield, claiming five aircraft destroyed. Shortly thereafter VT-9 attacked the airfield with fragmentation bombs, claiming another five aircraft. Launching from the *Intrepid,* VB-6 fielded 12 SBDs, escorted by 12 Hellcats from VF-6, to attack a small convoy west of Truk. The divebombers sank a tanker and damaged a freighter that sank sometime later.

The Hellcats of the *Yorktown's* VF-5 came under attack from a formation of 10–15 *Zekes* while escorting the TBFs of VT-10. Coming in toward the lagoon, three divisions of Hellcats went in with the TBFs, while a fourth division covered the SBDs. Just as the TBFs reached their pushover point at 14,000ft to begin their attacks, a formation of *Zekes* dived down out of the sun on Lt (jg) Robert Duncan's Hellcat division. A dogfight developed, with the *Zekes* making repeated passes against the Hellcats, but these attacks were uncoordinated and concluded with poor recovery techniques. This enabled the Hellcat pilots to break up the Japanese attacks and claim six Zeroes destroyed and two probables. Duncan, who had two previous victories, claimed four Zeroes destroyed, making him an "ace" (a pilot with five or more confirmed aerial "kills").

Other Hellcats also ran into *Zekes* while covering the Avengers. The second element leader, Lt (jg) B.L. Taylor, claimed one shot down and his wingman claimed a second. Division leader Lt (jg) Theodore Schofield started a strafing run on the airfield on Eten, but pulled up when he saw *Zekes* flying above him, two of which he dispatched, his wingman Ens James Brosnahan claiming a third. One of the Zeroes they claimed crashed into three *Kate* bombers on Eten airfield, all four aircraft bursting into flames. Leading a division of four Hellcats as Target Observer, Lt-Cdr E.E. Stebbins, commander of Air Group Five, ran into a formation of Japanese fighters, claiming a *Hamp* shot down, his wingman claiming a second.

The sixth and last strike of the day brought more attacks on the airfields and the last air combats of Operation *Hailstone*. Mitscher wanted to make sure that Truk's airfields could not be used to launch night raids against TF 58, so he sent the air groups out to disable the airfields and drop delayed-action bombs that would go off through the night.

Air Group Ten bombed the airfield on Moen. The TBFs of VT-10 flew over the field dropping 100lb (45kg) fragmentation bombs, followed by the SBDs of VB-10, which attacked revetments, claiming nine Mitsubishi G4M *Betty* bombers destroyed. Five of the 12 VF-10 Hellcats escorting the bombers dropped single 1,000lb bombs with delayed-action fuzes on the runway. Two divisions followed, strafing aircraft on the airfield and setting 11 fighters on fire.

Air Group Five went to Parem, bombing the airfield there and dropping delayed-action bombs. Following on, Air Group Nine bombed and strafed Parem, working over the aircraft that had been strafed during earlier strikes, while Air Group Six took on Moen. Air Group 17 attacked the airfield on Eten, accompanied by five Hellcats from VF-25, each carrying a single 1,000lb bomb. After the Hellcats had dropped their bombs, the SB2Cs of VB-17 went into their dives through heavy anti-aircraft fire that killed one of the Helldiver gunners, dropping their bombs on the service apron and along the runway.

As he led his division away from Moen airfield after its second strafing pass, Walter Harmon saw a *Zeke* 1,500ft (455m) below him, then a second on his starboard beam. Harmon made a high-side run on the *Zeke* below him, but the Japanese pilot turned into the attack, firing on Lt (jg) Woodward Hampton, Harmon's section leader, who was heading after the second *Zeke*. Harmon continued after the first *Zeke*, which was being flown by a pilot of real ability. Harmon and the Japanese pilot fought for 15min, an exceptional length of time in air combat, until Harmon got in a burst that apparently killed his opponent. The *Zeke* went straight into the side of a mountain on Moen.

While Harmon was fighting his extended combat, two more Zeroes entered the fray, latching on to Lt (jg) Larry Richardson, Hampton's wingman. Hampton had been forced to withdraw after a *Zeke* had damaged his tail, and headed for the Northeast Pass. Richardson fought off the Zeroes as best he could, until one Japanese pilot latched on to his tail and peppered the Hellcat with cannon and machine-gun fire. Harmon returned in time to drive the *Zeke* off Richardson's tail. Returning to the *Enterprise*, Richardson found that he could not lower the undercarriage, so ditched alongside a destroyer.

Meanwhile, Hampton had hoped to find friendly aircraft around the Northeast Pass, but instead found a *Hamp*, a *Zeke* and a *Rufe* in the area awaiting crippled American aircraft. All three made repeated attacks on Hampton, who noticed that the pilot of the *Hamp* would pull out of his runs close to his Hellcat. Hampton pulled up and fired on the *Hamp*, finally hitting the Japanese fighter. The *Hamp* started smoking, rolled over and headed down toward the sea. After several more runs, the *Zeke* pilot made the same mistake, pulling up ahead of Hampton, who opened fire. The *Zeke* burst into flames and rolled away to port. By now Hampton had only his three port machine-guns firing. As the *Rufe* came in on him, he chopped the throttle and fired on the floatplane fighter as it flew past. The *Rufe* climbed away and did not return. Returning to the Task Force, Hampton found that his controls were damaged, so he also ditched successfully near a destroyer.

THE EMPIRE STRIKES BACK

The night of February 17 was eventful for both sides. During the night a small formation of IJNAF *Kate* torpedo-bombers came after TF 58. The aircraft came in singly from around 2100hr. Nightfighters were launched to hunt down the Japanese bombers, but without success. The Task Force's radars identified a contact at around midnight. This aircraft made an attack on the

NARA VIA AUTHOR

AVENGER vs ZERO

DESPITE HEAVY LOSSES during the first early-morning wave of strikes on February 17, some IJNAF Zeroes managed to take off against the afternoon attacks, and one of these nearly shot down one of VT-10's TBFs. As the US Navy squadron's formation began an attack on shipping on a large freighter steaming near Dublon Island, Lt (jg) Bob Jones found himself separated from the rest of his section and alone. Flying a single Avenger over Truk Lagoon was not for the faint-hearted and Jones soon attracted the unwanted attention of a *Zeke*. His first inkling of trouble came when bullets began raking his wings and cockpit. Jones looked out to see flames pouring out of his port wingroot. Alerting his crew to prepare for a ditching, he dived down to the sea to escape his attacker.

Jones's unlikely rescuer was fellow VT-10 pilot Lt (jg) Charles Henderson. Heading back to the rendezvous, Henderson spotted a TBF ahead of him trailing smoke with a *Zeke* on his tail. Despite the fact that he was flying the portly Avenger and not a Hellcat, Henderson dived down to get on the *Zeke's* tail, only to discover that his wing guns were out of ammunition from an earlier attack on a *Pete* floatplane. He told his turret gunner that he was going to pull up alongside the *Zeke* to give the gunner a clear shot, but this attempt made the Japanese pilot "mad as hell", although it did distract him away from Jones's damaged Avenger.

Henderson then engaged in a remarkable one-on-one combat with the Japanese pilot. As the *Zeke* came in on a high-side run, Henderson turned in to the attack and did a half snap-roll just before the *Zeke* could open fire. The Avenger and the *Zeke* went at each other four times, until the Japanese pilot ran out of ammunition. With a waggle of wings, he flew off to his base.

Jones, meanwhile, had made it back to the *USS Enterprise*, where his extensively battered aircraft was promptly pushed over the side.

TOP *Bob Jones climbs out of his Avenger on the* Enterprise *having been mauled by a* Zeke*; note the bullet holes in the leading edge of the TBF's wing.*

LEFT ***Pilots of VF-10 — the "Fighting Ten" — share a laugh with their Air Group Ten Commander, Cdr William "Killer" Kane, seated at far right. Among the pilots are Joseph "Frenchy" Reulet, seated second from left, and Lt (jg) Philip Kirkwood, seated third from left, who was credited with four kills in the Hellcat and another eight when the unit converted to the F4U Corsair in 1945.*** NARA

OPPOSITE PAGE ***The final strike of Operation*** **Hailstone** ***on February 18, 1944, set fire to the oil storage tanks on Dublon Island, creating a huge pall of black smoke that rose thousands of feet into the air above the lagoon. This attack was left until last so as not to reduce visibility.***

Intrepid, launching a torpedo that struck the carrier astern, jamming the rudder and opening a hole in the hull. The *Intrepid* had to withdraw from Task Force 58.2 and return to the USA.

At around 0400hr on the morning of February 18, 12 TBFs of VT-10 launched from the *Enterprise* for the US Navy's first low-altitude night-bombing attack on enemy shipping from a carrier. Before leaving for combat in the Pacific, the crews of VT-10 had practised such attacks for months, using radar to identify targets. The three divisions of Avengers flew the 88 miles (140km) to Truk, where they split up, five aircraft circling the Northeast Pass, while the other seven flew across the lagoon to circle the north-west corner. The Avengers went in individually on their radar-guided attack runs, the aircraft circling the Northeast Pass covering the anchorages around Moen and Eten islands, their colleagues to the north-west taking the large anchorage area west of Moen and Dublon islands.

Each Avenger carried four 500lb (225kg) bombs. The procedure VT-10 had practised called for the pilots to identify a target on radar, approach the target at an altitude of 1,500ft (450m) and a speed of 180kt, and count for 2sec once the target had disappeared under the nose of the Avenger before releasing the bombs. Most pilots went in at a much lower altitude to make sure of hitting their target. The bombs had 5sec-delay fuzes to allow the Avenger to escape the blast. The profusion of ships and small islets in the lagoon made it difficult to identify targets on the radar, requiring several approaches.

As the Avengers began their runs into the lagoon, a red flare bloomed above Moen signalling an American attack. The night sky erupted with anti-aircraft fire as batteries on the islands and ships sought out the American aircraft, firing blindly up into the sky. As the aircraft came closer, the gunners could aim at their exhaust flames, and several Avengers were hit as they went over the anchorages. As one pilot finished his run, he would call on the radio for the next crew to begin its attack. The attacks went on for 30min. In return for the loss of one Avenger to anti-aircraft fire, VT-10 claimed eight ships destroyed and five damaged during the night attack.

The second day of strikes against Truk was something of an anti-climax. The attacks began with another fighter sweep to clear the air of any Japanese aircraft before the bombers arrived. Fighters from the *Enterprise*, *Yorktown*, *Essex* and *Bunker Hill* came in over Truk to find not one Japanese aircraft in the air. The Japanese had apparently flown out any remaining operational aircraft during the night.

Units VF-5 and VF-10 went down to strafe the airfields on Eten, Moen and Parem, raking aircraft already damaged in previous attacks. The Hellcats of VF-9 strafed Moen, then went after shipping. During the last strafing attack anti-aircraft fire hit Lt (jg) George Blair's Hellcat, forcing him to ditch within Truk Lagoon south of Uman Island. While calling for a rescue, nine of his squadron mates circled above protecting him, each leaving only when their fuel was low. When a Japanese destroyer headed toward Blair's liferaft, the Hellcats made strafing runs, forcing the destroyer to turn away. This went on for 30min, until there were only two Hellcats remaining with enough fuel to cover the downed airman. The Japanese destroyer eventually steamed away.

By this time the *USS Baltimore* had launched a

NATIONAL NAVAL AVIATION MUSEUM

Vought OS2U-3 Kingfisher rescue floatplane. With an escort of Hellcats from VF-9, Lt (jg) Denver Baxter set off for Truk Lagoon. Baxter alighted near the exhausted fighter pilot, the Kingfisher's radioman, Reuben Hickman, stepping out on to the wing to help Blair into the rear cockpit. When the Kingfisher was hoisted aboard the *Baltimore* on its return, there was one pint of fuel remaining in the aircraft.

Over the next few hours the air groups completed three strikes against the remaining ships in the lagoon. While no Japanese fighters rose up in defence, the anti-aircraft fire remained heavy over some of the islands. One TBF of VT-5 was lost to anti-aircraft fire, but the crew was rescued. The escorting fighters continued their strafing attacks on shipping and airfields.

On the third and last strike of the day, Air Group Ten went after oil storage tanks on Dublon. Mitscher had saved this target for last so that the smoke from burning oil would not interfere with attacks on shipping in the nearby anchorages. The Dauntlesses and Avengers of VB-10 and VT-10 respectively bombed the tanks, leaving a huge column of oily black smoke rising over Dublon. When the last aircraft had alighted, TF 58 withdrew, heading north for the Marianas.

PROOF POSITIVE

In two days of strikes on Truk TF 58 had inflicted severe damage, leaving the Japanese naval base practically defenceless. The Task Force's bombers had destroyed ten IJN vessels, including three light cruisers, three destroyers, a seaplane tender and a submarine tender, and sank 31 valuable merchant ships. The air battles over the lagoon and the attacks on the airfields had destroyed approximately 270 of 365 Japanese aircraft on the islands at the time of the attack. Not surprisingly given the intensity of the combat, fewer aircraft were actually shot down than were claimed, and conversely more were destroyed on the ground than originally estimated. Task Force 58's squadrons claimed 127 Japanese aircraft shot down and 152 destroyed on the ground or water, while the actual losses were some 235 aircraft destroyed or severely damaged on the ground and around 50–70 in the air.

The IJNAF air units were hard hit. The 204th Kōkūtai lost 18 of 31 Zero pilots, while the 902nd Kōkūtai lost all nine of its A6M2-N *Rufe* fighters. Critically, the attack on Truk destroyed large numbers of replacement aircraft destined for Rabaul on New Britain (now Papua New Guinea) and other important Japanese bases. In return, Task Force 58 lost 25 aircraft shot down or damaged beyond repair and 26 of its crewmen.

Beyond the destruction of Japanese war materiel and the shattering of the myth of Truk's impregnability, the US Navy's carrier raid on Truk and subsequent strikes on the Marianas represented a revolution in naval air warfare. Operation *Hailstone* had demonstrated that the Navy's Fast Carrier Task Force had the mobility and striking power to disrupt Japanese air and naval forces and limit their ability to hamper American amphibious operations. Rather than covering the landings on Eniwetok from a short distance away, Task Force 58 used the bulk of its force to strike deep into Japanese-controlled territory in a strategic rather than tactical way, establishing a pattern for later battles around the Marianas, Philippines and Okinawa.

"Ladies and gentlemen, we have had some minor trouble . . ." This remarkable photograph was taken by one of the passengers aboard Boeing 707 N761PA shortly after take-off from San Francisco International Airport on the afternoon of June 28, 1965. With the fuel pipes ruptured after the departure of No 4 engine, the starboard wing trails a plume of flame. PAN AM ASSOCIATION VIA SFO MUSEUM COLLECTION

THE MIRACLE OF FLIGHT 843

June 28, 1965: it is a routine Monday afternoon Boeing 707 flight from San Francisco to Hawaii for the crew of Pan Am Flight 843 — until No 4 engine catches fire after take-off and shears off, taking a sizeable chunk of the outer wing with it. Fifty years on, **MELVYN HISCOCK** reveals how superb airmanship averted a major catastrophe

ON JUNE 28, 1965, Capt Charles H. Kimes was in charge of Pan Am Flight 843 from San Francisco to Honolulu, Hawaii, with 143 passengers and ten crew aboard. Kimes, who had flown military transport missions for Pan Am during World War Two, was 44 years old and had accrued a total of 17,736 flying hours. In the left-hand seat was First Officer Frederick R. Miller, who was a little older at 48, and who had ratings on the Douglas DC-3, DC-4, DC-7, Boeing 377 Stratocruiser and some 2,817 flying hours' experience on the 707. The second officer, Max A. Webb, was 46 and rated on the DC-6 and DC-7, and had a total of 35 flying hours on the 707 from his total of 13,826 hours. The flight engineer was Fitch Robertson, 44, who was also a private pilot, and who had accrued a total of 17,753 flying hours, 3,901 of which were on the Boeing 707. There was certainly no shortage of experience on the flightdeck. There were also six cabin crew, comprising two pursers and four stewardesses.

The flight was loaded and ready to go, and lined up on Runway 28L at San Francisco International Airport just after 1400hr local time. The temperature was a sunny 25°C (77°F) with eight miles (12km) visibility, and a breeze coming off the ocean from 310° at 15kt.

AUTHOR'S COLLECTION

ABOVE ***A rare photograph of 707 N761PA at the Boeing factory at Renton, near Seattle, before joining Pan Am in June 1962. The aircraft was the second production 707-320B (designated -321B in Pan Am service), the new variant replacing the 320's turbojets with turbofans and an improved wing of increased span and reduced drag.***

In an interview conducted for the San Francisco Airport Oral History Programme in December 1997, Fred Miller recalled, "It was the first time I'd ever seen [Kimes]. I'd never heard his name before. He said 'I've been off sick the last couple of weeks. I don't feel good, why don't you make the take-off?". According to Civil Aeronautics Board (CAB) records, Kimes had been off the roster for the preceding five-and-a-half days.

The Boeing 707-321B used for Flight 843 on the day was N761PA (c/n 18336), named *Jet Clipper Friendship* in line with Pan Am's tradition of giving its fleet names prefixed with "Clipper", dating back to the company's flying-boat days. *Friendship* had been rolled out in January 1962 and was powered by four Pratt & Whitney JT3D-3B turbofan engines, each capable of 18,000lb static thrust for take-off. The airframe had accrued a total of 12,789 flying hours and its most recent airworthiness certificate had been issued less than two weeks earlier, on June 15. The engines varied in hours with No 1 having accrued 1,363 flying hours since major overhaul, No 2 some 4,149 flying hours, No 3 a total of 1,817 flying hours and No 4 a mere 39 flying hours. The 707 had taken aboard 88,000lb (39,915kg) of fuel and its all-up weight was 266,631lb (120,940kg), well within the limits of the airframe. On the face of it, everything was fine.

Miller lined the airliner up on Runway 28L at 1409hr. It was normal to aim for the cleft in the hills between the airport and the Pacific, as the climb rate of the 707 fully laden was known to be less than sparkling, and there was more chance of escape should something go wrong — such as losing an engine on take-off.

"HEY, WE'RE ON FIRE . . ."

The jetliner accelerated normally and all went well for the first few seconds of the flight. But as the jet reached about 800ft (245m) something was clearly amiss. Miller recalled:

Jet Clipper Friendship ***at Heathrow in February 1963, while operating on Pan Am's transatlantic service. By the summer of 1965 N761PA had been transferred to Pacific operations and was a regular on the San Francisco—Honolulu service.***

PETER KEATING © A FLYING HISTORY LTD

PHILIP JARRETT COLLECTION

ABOVE ***The undercarriage of a Pan Am 707 is pulled up sharpish as it roars away in this airline publicity still. Pan Am inaugurated its jetliner service between San Francisco and Honolulu in August 1959 using its newly-delivered turbojet-powered 707-121s, which rapidly replaced its fleet of ageing Boeing 377 and Douglas DC-7C propliners.***

"There was a big shock and a bang and the aircraft swerved; it felt like the tail was coming off or something was coming apart. We got a fire warning on the No 4 engine and I looked out the side [window]. I'm the only one who can see out that side because the wings sweep back at such an angle. I said 'Hey, we're on fire'. [Kimes] said 'Go ahead and do the thing'. So I went through the fire procedure and got the fuel shut off and shot the fire-bottle into it. The flames went down to about half and I switched to the other fire-bottle and gave it the second shot and the fire went out."

According to the CAB report, dated October 5, 1966: "Witnesses stated that the take-off and initial climb were normal. Shortly after the climb was initiated, ground-based witnesses observed a fire around the No 4 engine. At this time the crew noted heavy vibration and yawing of the aircraft.

"The crew initiated shut-down procedures for the No 4 engine until they received an intermittent fire-warning signal. They then initiated engine fire-fighting procedures for the No 4 engine. During this period the right [No 4] engine and approximately 25ft [7·6m] of the right [starboard] outboard wing separated from the aircraft".

The report went on to state that "the No 3 turbine disk in the No 4 engine failed owing to a localised reduction in its cross-sectional area and overheated conditions due to rubbing between the turbine disk and the third-stage turbine inner sealing ring immediately forward of the disk. This rubbing was the result of a transient loss of clearance between the parts on take-off. The maximum difference in the thermal expansion rates of the rotating assembly and the outer turbine cases which support the inner sealing ring occurs 1–2min after application of full power". The report continued:

"The disk failure resulted in an explosive failure of the No 4 engine and its separation from the wing owing to high vibration and out-of-balance oscillation of the rotating parts of the engine. The [starboard] wing received so much damage to the lower load-bearing skin and structure that the ability of the wing to sustain in-flight loads reduced below the loads imposed, and the outer wing panel separated from the wing.

"Fuel from the engine fuel line was then being pumped directly into the airstream. The fuel was ignited by an undetermined source shortly after the engine separated and resulted in an explosive separation of a portion of the lower wing skin. The fire was sustained by the continued supply of fuel through the line until the flight engineer or first officer shut off the main fuel supply, either by activating the fuel shut-off valve to the closed position or actuating the fire selector handle."

BACK ON THE FLIGHTDECK . . .

Exactly what had happened was not immediately clear in the cockpit. As Miller later explained: "The aircraft was staggering along . . . kind of bouncing and bumping and the control wheel [yoke] was at about a 45° angle. The captain took over the flying when the incident occurred. That was normal procedure. It wasn't that he didn't trust me. It would be normal for him to take over. But he couldn't see the fire. He couldn't see how bad it was. I was the one who was in shock.

"Fortunately [Max Webb] had been in the

ALPHA ARCHIVE

ABOVE ***"Be there in half the time . . . enjoy twice the comfort" — so ran the Pan Am publicity campaign for its Intercontinental Jet Clipper service. The airline's standard configuration for its 707-321Bs accommodated up to 144 first-class and tourist passengers, five abreast in the former and six abreast in the latter, and up to ten crew.***

US Coast Guard and had written a book on emergency evacuation. His first thought — we were going out though the gap in the hills in San Francisco where there's nothing ahead but water — was to get some lifejackets on people because we may not stay in the air very long."

In the cabin the passengers were rather more aware of what was going on. Passenger Irene Lawliss, later interviewed for *Life* magazine, said: "The stewardesses came around with little programmes for the movie that they were going to show, and the kids were given colouring books and little wings. I was sitting right at the window above the wing and I must have been one of the first people to see the flames. The man in front of me was taking movies. At one point the purser told him to put his life preserver on — so his wife went on filming". The resulting film of the wing on fire was later shown in news programmes and may be seen on the *TAH* website at www.theaviationhistorian.com.

Another passenger interviewed by *Life*, Nancy Sweeten, described her experience:

"We took off and I felt the wheels tuck under the wings, or wherever it is they go. Barby, the girl with me, grabbed my hand. I heard this big *whoomph* — a big sudden explosion of flame. Then a second, louder thump came and I felt a slight lurch, and the 'plane rolled and rocked a little. Then the wing fell off; it felt as if the 'plane was falling out from beneath us. You could see fragments blowing out there, just hanging on. I was sure we were going to ditch in the ocean."

In the cockpit the crew was busy trying to work out the best course of action. The airliner was staying in the air but they were still at low altitude. Miller later recalled:

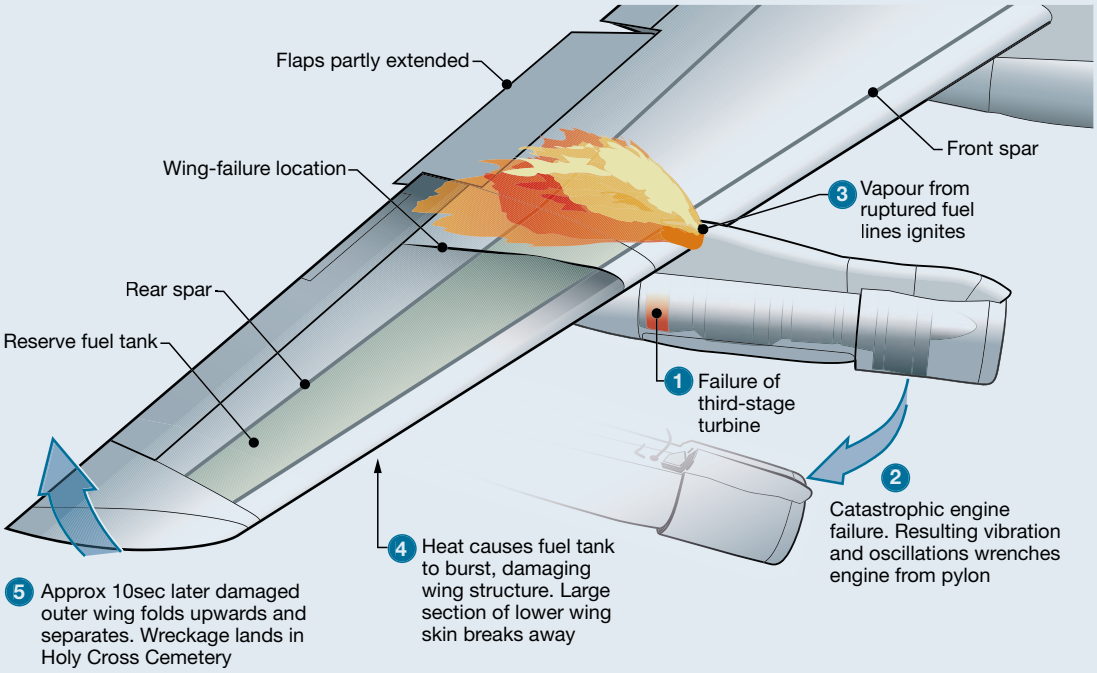
"[The flight engineer] ran back to the cabin, got everyone in lifejackets and came back up. I never did get mine on. But I was kind of busy talking to the tower. That was another thing — we got behind the hill and couldn't get the tower. Fortunately there was a Coast Guard 'plane flying around on some kind of exercise and they relayed [messages] for us."

Getting through the gap in the hills was one thing, but the latter were high enough to block radio transmissions. When contact with the tower was re-established Kimes asked if the runway could be foamed. Reportedly, the airport refused, saying that it would leave insufficient foam to extinguish any possible fire on the airliner once it was back on *terra firma*.

Kimes eased the stricken airliner up to about 1,200ft (360m) and spoke to the passengers over the intercom. Another *Life* interviewee, Jorge Rivera, recalled: "About this time the captain came over the PA system and said 'We have had some minor trouble . . . no, I shouldn't say minor'. Then everybody broke out laughing."

PLAN C

The options open to Kimes at this point were to ditch the aircraft in the Pacific, attempt to land back at San Francisco or devise a "Plan C". Ditching was discounted, as the 707 manual stated that the airframe was likely to break up in swells of more than 18in (45cm). A return to the



ARTWORK © 2015 JUANITA FRANZI / AERO ILLUSTRATIONS

airport was considered, but by then the airliner was north of it and a circuit back into the airport would mean turning into the damaged wing. Such turns would be made over built-up areas, and if the aeroplane stalled off the turn — which was a possibility — it could fall on populated areas and cause even more casualties.

"Plan C" it would have to be. Kimes elected to aim for Travis Air Force Base, 60 miles (95km) to the north-east. Not only were the runways longer and the approaches clearer, but there was the provision of military firefighting equipment. Kimes was also aware that a hospital had been built there for the expected casualties due to come back from the escalating conflict in Vietnam.

The crew was largely unaware of how much debris had fallen from the aircraft, as the sweep of the wings made it difficult to see from the cockpit. The main part of the engine had fallen on Montgomery Avenue in San Bruno, just under two miles (3km) from the end of the runway. It crashed through the roof of a woodwork shop, where seven people were at work, and exited through a concrete wall to end in an alley.

Smaller parts of the engine were strewn in a line tracing back to the airport. Parts of the wing were soon found three miles (5km) from the runway, the main section coming to ground 3½ (5·5km) miles from the airport. A large section of the underwing skin and a 12in (30cm) section of spar was found at five miles (8km), with other pieces being found up to 8¼ miles (13km) from the runway's end. Incredibly — and to the crew's later relief — there were no injuries on the ground.

ABOVE ***Officials inspect the remains of N761PA's No 4 engine in the suburb of San Bruno. The JT3D sheared through the concrete wall of a furniture shop, seen here on the right, missing workmen by 15ft (5m), before coming to rest in the adjacent alleyway.***

The approach to Travis was not without problems. The explosion of the wing had damaged the hydraulic lines, resulting in no power to the undercarriage and flaps. In the event of a hydraulic failure, the undercarriage could be lowered manually using a handle that was stowed in the cockpit on a fitting in the floor, but the nosewheel would not lock unless the pin was inserted manually into the gear. This would require a crew member to descend through a hatch in the cockpit floor, enter the hold and insert the pin. Max Webb hand-cranked the gear down and Fitch Robertson crawled into the hatch on approach at about 700ft (210m).

Operation of the flaps, which had an electrical back-up system, would also require some careful

AUTHOR'S COLLECTION

ABOVE ***Federal investigators study the charred stub of N761PA's starboard outer wing at Travis. Captain Kimes initially speculated in press conferences immediately after the incident that it may have been caused by a birdstrike during take-off, but it quickly came to light that it was mechanical failure owing to flawed maintenance.***

LEFT ***Charles H. Kimes in characteristically humble pose during one of his many press conferences after the forced landing. Kimes was also rated on the Douglas DC-4, DC-7/7C, Curtiss C-46 and Boeing 377. He gained his 707 rating in May 1958 and by the time of the incident had accrued more than 2,600 flying hours on the 707.***

handling, as only those inboard could be used — an asymmetric flap configuration would have caused unpredictable roll problems.

The drama was not yet over, as the article in *Life* magazine rather breathlessly related:

"On the approach [to Travis] came a final unexpected hazard. Smack off the end of the runway, right in his glidepath, [Capt Kimes] saw a 'dust devil' whirlwind, which would create a perilous turbulence if he tried to fly through [it]. He had just enough room to go around it and get back on course. At 1434hr, after exactly 24min in the air, he made a perfect touchdown."

GIRDLES GALORE!

Others were equally full of praise for the pilot and his crew. Mrs Lawliss, in her *Life* interview said: "We had a perfect landing at Travis. In fact the landing was better than the take-off, which had seemed pretty rough to me". In a television interview in 2004, flight engineer Fitch Robertson recalled that "it was a beautiful landing; just barely came down, hardly a jolt at all". Fred Miller also described the landing in his 1997 interview:

"So we came whistling over the fence. I don't know for sure what the speed was. The landing was going good. I'll give him credit, he made a fine landing."

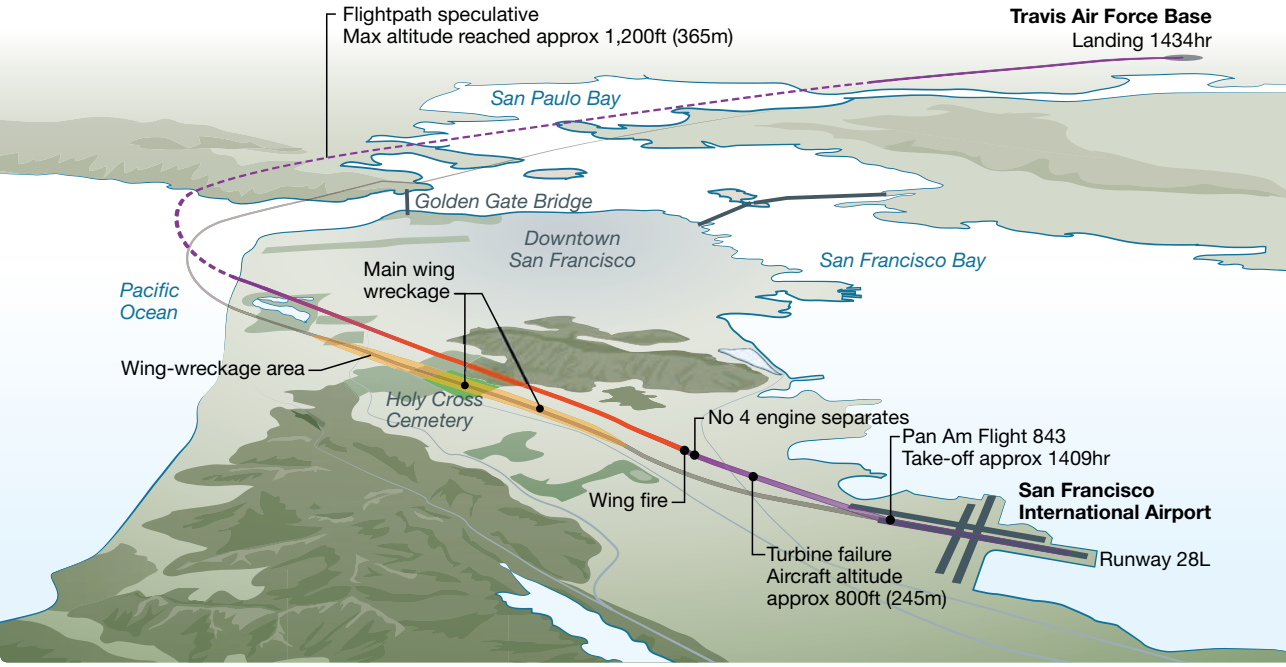
After touchdown there was just about enough emergency hydraulic power to use the brakes, but not for the nosewheel steering, so the airliner was evacuated on the runway. The crew had briefed passengers correctly and the evacuation was orderly, quiet and over in just 4min. Robertson was unaware that the engine had departed until he reached the tarmac. "That's the first time I knew we'd lost the engine," he explained, adding "it was then I got that 'I-hope-it-didn't-hit-anybody' [feeling]".

Passenger Barby Twelvetrees explained in the subsequent *Life* article, published on July 9, 1965: "When I got out of the airplane I had no shoes on and I ripped the heck out of my hose on the asphalt . . . I [had] chewed all my lipstick and I was soaking wet from perspiration . . . my first reaction was 'all those nice-looking Air Force fellows and I have to look like this!'".

Fellow passenger Eloise Parlette added: "We slid down the escape chute, which was about 40ft [12m] above the ground. I remember thinking: 'I bet those guys down there have never seen so many girdles!'".

In his 1997 interview Fred Miller remembered being last off the aircraft, although it would be normal in an evacuation for the captain to be the last to leave, having made sure that everybody was out. Kimes's son Chuck later told the author that "my dad walked from one end [of the aircraft] to the other, checked everyone was off, went back to the cupboard behind the cabin, put on his Pan American officer's hat, Pan American Captain's jacket and went down the slide a properly dressed Pan American Officer".

The immediate danger having passed, Pan Am now faced the logistical problem of getting the 143 passengers out of Travis and off to Honolulu. A second 707 was sent to Travis, where it landed safely and rolled to a stop in its parking spot — before the nosewheel collapsed. Whether this was down to a hydraulic problem or a crew mistake is not clear. A third aircraft was then despatched and all but eight of the passengers embarked in



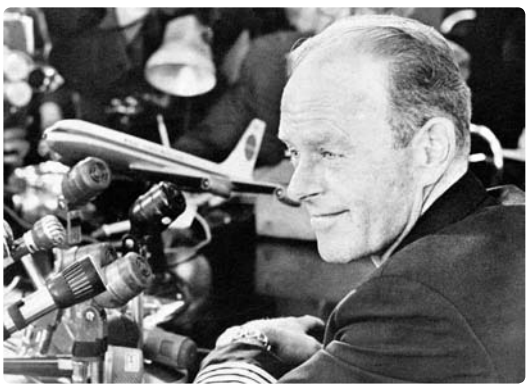
it, the 707 initially flying back to San Francisco and then, after complimentary food and drink courtesy of Pan Am, on to Honolulu.

THE AFTERMATH

The subsequent CAB inquiry noted that "the engine was assembled without proper measurements being made to ensure [the] correct axial positioning of the low-pressure turbine rotor assembly". Workshop procedures by Pan Am and misleading information by Pratt & Whitney in its assembly instructions were blamed. The engine overhaul manual stated that "hand force" may be used to install the third-stage vanes and sealing ring but the CAB report stated that the use of a combination of new and used vanes could lead to hand force being inadequate to seat the ring properly. It also noted that "the operational clearance of vanes [that were worn by 0·007in or more] was less than that predicted analytically for a properly assembled engine".

The inquiry concluded that "the probable cause of this accident was the failure of the third-stage turbine disk. This was caused by a transient loss of operating clearance between the third-stage turbine disc and the third-stage inner sealing ring. This loss of clearance resulted from a combination of improper turbine rotor-positioning during engine assembly, the use of serviceable worn parts and an operating clearance which was less than predicted in design analysis".

As with most aviation-related incidents, it was not one factor but a number of factors that led to the the failure of the engine. The CAB recommended changes to Pan Am's procedures and to Pratt & Whitney's manual for the engine.



ABOVE ***Kimes looking rather nonplussed at all the attention at an official Pan Am press conference. In a letter to Pan Am dated July 7, 1965, Flight 843 passenger Ruby Leonard wrote: "How Captain Kimes and the crew landed the ship safely and got us out of that 'plane was nothing short of a miracle . . .".***

Following the accident N761PA was reportedly flown, minus the outboard section of the starboard wing, from Travis to Seattle, where a new wing was fitted by Boeing. The 707 was returned to the Pan Am fleet and served until May 1977 when it was sold to Air Manila International and put on the Philippine register as RP-C7075. In 1985 it was returned to the American register as N944JW with International Air Leases of Florida before being bought back by Boeing in 1986 to serve as a spares source for USAF KC-135s. Parts of the aircraft are still thought to be at the sprawling Davis-Monthan complex in Arizona.

In the immediate aftermath of the incident the crew undertook numerous press conferences,

ANDREA EDGE VIA AUTHOR

ABOVE ***Photographer Joe Rosenthal (far right) — who famously snapped American soldiers raising the flag on Iwo Jima during World War Two — organises the Flight 843 crew for a publicity photograph in the wake of its dramatic 25min flight. Kimes, seated in the middle, later made some of Pan Am's final flights out of Saigon in 1975.***

CHARLES KIMES DFC?

ONE OF THE more unusual decorations awarded to Charles Kimes after the Flight 843 incident was a British Distinguished Flying Cross (DFC) that had originally been awarded to Flt Lt Dennis A. Newman, an American who flew for the RAF during the Second World War. Newman was awarded the DFC for bringing his severely damaged Avro Lancaster back after a raid on Stuttgart on the night of January 28–29, 1945.

In a report in the November 25, 1965, issue of the *San Francisco Chronicle,* Newman said that "the medal had been lying in my bureau drawer for 20 years" and that he had decided to present it to another accomplished pilot who had brought his machine home against the odds. Newman sent it to Kimes's home. The report continued:

"'I didn't know what to do with it,' Kimes said, deeply touched . . . 'then the Airways Club [an American organisation of 25,000 airline passengers] got in touch with me and I told them about Newman's medal . . . [the club] decided to award it as its first Aviation Safety Award to me and my crew'."

The DFC was duly handed over to Kimes by Brig-Gen John Kenderdine, a US Army aviation fuel specialist, at Pan Am's San Francisco offices on November 23. It was decided that Kimes would hold the medal for one year after which it would be awarded annually to the person or persons deemed by the Airways Club to have furthered the cause of passenger safety and convenience most over the previous 12 months. **MH**

with calls from several organisations to decorate the crew. The Federal Aviation Administration (FAA) awarded the crew its Decoration for Exceptional Service. Fred Miller later recalled:

"Actually they were only going to give one medal to Kimes and he said 'No, the whole crew is a bunch of heroes. They all ought to get medals'. So the FAA gave them to all ten of us."

There were other awards — the Daedalian Foundation awarded Kimes its Lt-Gen Harold L. George Civilian Airmanship Award for 1965. The citation from another award, from Pan Am, by order of its legendary founder Juan Trippe himself, rather long-windedly read:

"The Board of Directors hereby expresses its deep respect and admiration for the cool-headed judgment and courage of Captain Charles H. Kimes and the skill, teamwork and devotion to duty displayed by him and each of his crew: First Officer Fred R. Miller; Second Officer Max A. Webb; Engineer Fitch Robertson; Pursers Harry A. Green and Joyce M. Norquist and Stewardesses Barbara L. Grad, Ann M. Ogle, Dorothea E. Small and Joan J. Waters in the successful landing of their Jet Clipper on June 28, 1965, and extends to each of them its appreciation and congratulations for one of the most outstanding and gallant performances under an emergency in the history of commercial aviation."

Kimes also received letters from some of the passengers aboard Flight 843 and from people who had witnessed the incident from the ground.

AUTHOR'S COLLECTION

ABOVE ***With the starboard wing repaired and a new No 4 engine fitted, N761PA was returned to Pan Am, with which it served until the spring of 1977, when it was acquired by Philippine airline Air Manila International. The airline continued to operate scheduled services with the long-serving 707 until it was withdrawn in early 1981.***

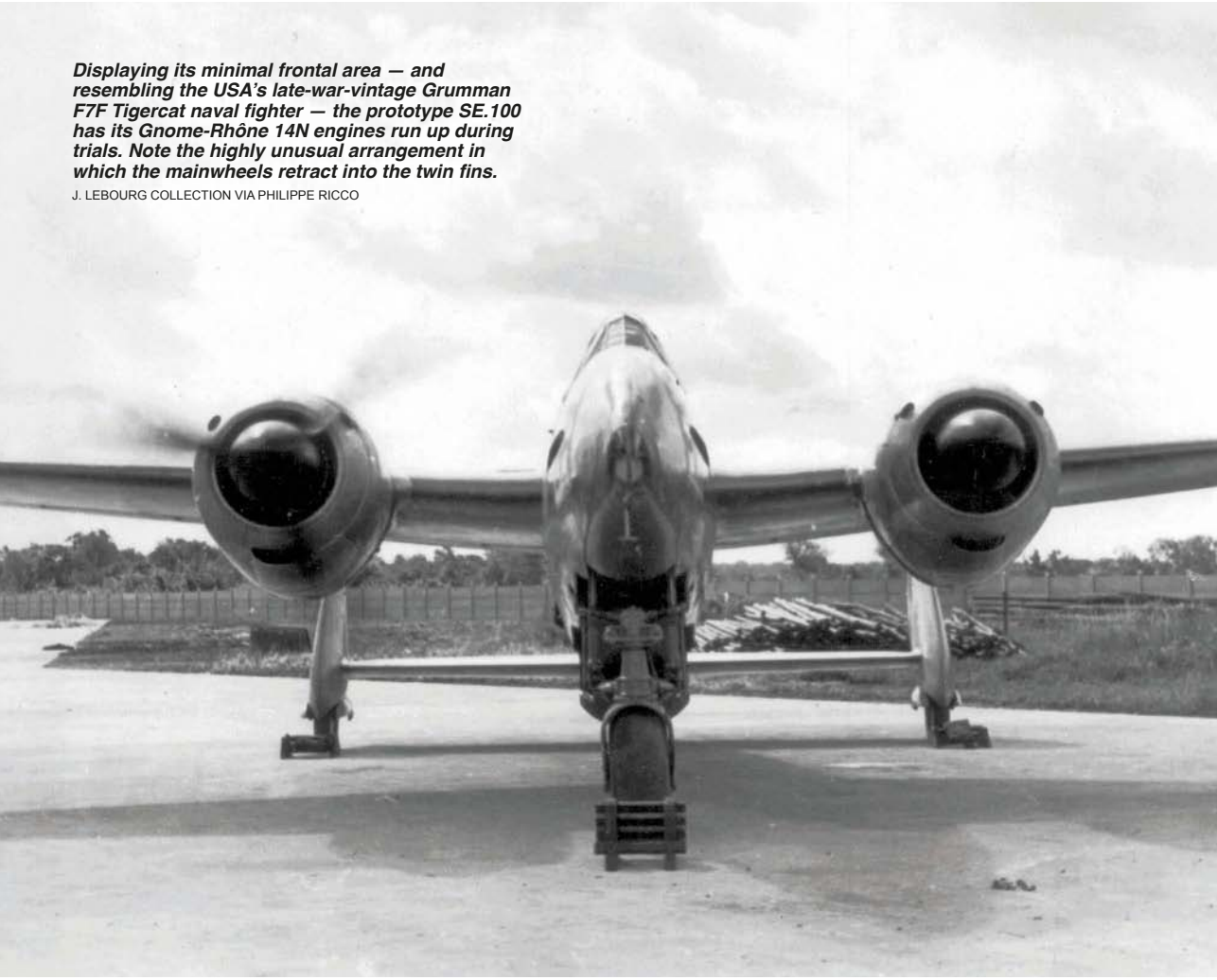
Mrs Dunn, of Rodeo, California, who watched events unfold from the ground, wrote to Pan Am, stating: "You have one of the best pilots that ever flew a 'plane. It would be a thrill of a lifetime to shake his hand". Passenger Vicki Vaughn, 11 years old and travelling on her own to a children's camp in Japan via Honolulu, ended her letter to Kimes thus: "I am very grateful to you and your crew. You're a right good pilot, sir, keep it up!"

Kimes went on to fly Boeing 747s for Pan Am and later received an award from the USAF for making 88 volunteer flights into Saigon during the Vietnam conflict, including some of the final scheduled flights into and out of the city.

More than 40 years later echoes of Flight 843's miraculous escape owing to a high standard of airmanship were to be found in the January 2009 ditching of a US Airways Airbus A320 in New York's Hudson River following engine birdstrikes after take-off from the city's LaGuardia Airport. As in the case of Flight 843, the pilot — former USAF F-4 Phantom driver Capt Chesley "Sully" Sullenberger — used his vast experience and essential flying skill to ensure a safe outcome. Sadly this is not always the case; the loss of an Air France Airbus A330 on a flight from Rio de Janeiro to Paris five months later, resulting in the death of all 228 aboard, was due, in part, to its pilots not applying basic "stick-and-rudder" principles. Charles H. Kimes and his crew were of an older generation using comparatively primitive equipment, but the author — a friend of Charles's son Chuck, tragically killed in a take-off accident in Dubai — knows which he would rather fly with.

ACKNOWLEDGMENTS *The author would like to thank Andrea Edge — and the Editor thanks Colin Higgs, David H. Stringer and Julie Takata and Tomohiko Aono at SFO Museum — for their vital help with this feature*

Another photograph of N761PA at Heathrow in February 1963, before it became famous for its role in the dramatic events over San Francisco in 1965. Note the ventral fin on the fuselage, added to some 707 models in order to improve lateral stability and prevent over-rotation during take-off. PETER KEATING © A FLYING HISTORY LTD



Displaying its minimal frontal area — and resembling the USA's late-war-vintage Grumman F7F Tigercat naval fighter — the prototype SE.100 has its Gnome-Rhône 14N engines run up during trials. Note the highly unusual arrangement in which the mainwheels retract into the twin fins.

J. LEBOURG COLLECTION VIA PHILIPPE RICCO

RUM PUNCH

The Unorthodox SNCASE SE.100

With Germany's territorial ambitions becoming increasingly clear by the late 1930s, France set its newly-nationalised aviation industry ambitious targets for the production of modern, effective military aircraft. **NICK STROUD** describes the development of one of its most unusual — and potentially useful — examples; the peculiar but pugnacious SE.100 twin-engined fighter-bomber aircraft

TOP: TAH ARCHIVE / ABOVE F. LENFANT VIA PHILIPPE RICCO

TOP ***The SE.100 prototype is prepared for flight during trials at Villacoublay. The distinctive triangular hatch in the rear fuselage provided access into a corridor which led to the cockpit.*** **ABOVE** ***The state-of-the-art SE.100 incorporated numerous ultra-modern features, including counter-rotating propellers — still uncommon in the late 1930s — for easier handling.***

WHEN WAR WAS declared on Germany by Great Britain and France on September 3, 1939, the French aircraft manufacturing group *Société Nationale des Constructions Aéronautiques du Sud-Est* (SNCASE) had a total of six aircraft designs in progress. The newly-nationalised company was certainly not lacking in ambition, its prospects including a giant transatlantic flying-boat and several designs for civil and military purposes.

Arguably the most radical, and what would certainly have been the most useful of these, was the SE.100 twin-engined fighter-bomber aircraft, developed from the unusual Lioré et Olivier LeO 50, which had been designed by Pierre Mercier and Jacques Lecarme. Despite its highly unorthodox configuration, the SE.100 had the potential to become an invaluable asset to the *Armée de l'Air*; had the type been available in numbers in the spring of 1940, its fearsome battery of nose-mounted 20mm cannon might well have been capable of punching a sizeable hole in Germany's lightning advance through western Europe.

L'ÉTATISATION

Mercier and Lecarme had started work on the unconventional design in late 1936, just as the French aircraft industry was on the threshold of a major nationalisation programme. In the wake of years of economic crisis and corruption scandals in the Third Republic, a wave of general strikes paralysed French industry in the mid-1930s, ultimately resulting in the election of the

TAH ARCHIVE

ABOVE ***This view of the prototype SE.100 in the SNCASE workshop at Argenteuil, undergoing final modifications to the hydraulic system, emphasises the type's banana-shaped fuselage. Mercier's design very much lived up to the specification of a thoroughly modern fighting aircraft, but its complex curves made it challenging to build.***

socialist Popular Front, under the leadership of Léon Blum, in June 1936. Following a spring of social unrest and civil disobedience, Blum negotiated with the unions for a 40-hour week (introduced into the aircraft industry three months before it was required by law), substantially raised wages and paid holidays for the workforce. France, mollified for the time being, went back to work.

On July 17, 1936, the French Chamber of Deputies voted by 484 votes to 85 to set in motion the nationalisation of the country's war industries. It was not before time. The French aviation industry had been in need of root-and-branch reform for decades. The manufacturing companies, run by risk-averse businessmen too wedded to short-term profits, had failed to streamline the industry and modernise production, leaving the French technologically far behind many of its European neighbours — including the rapidly-rising phoenix of Hitler's Germany, a nation clearly looking to a militarily strong future, despite the original prohibitions of the Treaty of Versailles.

Not all French commentators were convinced by the prospect of nationalisation, however. Georges Houard, Editor of French magazine *Les Ailes*, was strident in his view that nationalisation would destroy the lifeblood of the industry, namely its competitive character and propensity to foster an environment of unfettered creativity. "From the moment the law on nationalisation is accepted, " he wrote, "French aviation will cease to be free. Aviation will be muzzled under the odious, ridiculous and false pretext that the aircraft is a weapon of war". Houard favoured a system in which privately owned manufacturing companies would work together to achieve a balance of military and civil projects which best served the nation, rather than "suffocate" the industry with the "sterilisation" of nationalisation.

Despite such protests, the Senate ratified the decision to nationalise on August 7, stating that by no later than April 1, 1937, six aircraft manufacturing companies under direct government control would be established. These *Sociétés Nationale de Constructions Aéronautiques* would be organised according to geographical location, the new groups becoming Nord (North — SNCAN); Ouest (West — SNCAO); Midi (South — SNCAM); Sud-Ouest (South-West — SNCASO); Centre (Central region — SNCAC) and Sud-Est (South-East — SNCASE).

It was not to be full nationalisation, however. In order to maintain the creative spirit championed by Houard, and to keep the cream of France's aircraft designers and their respective employers financially motivated, a new "mixed" model was established, in which the state would own two-thirds of the company's stock, with the other third being retained by private investors.

Formed from the workforce and factories of five previously privately-owned companies — Potez at Berre, *Chantiers Aéronavals Etienne Romano* (CAER) at Cannes, *Chantiers Aéro-Maritimes de la Seine* (CAMS) at Vitrolles, *Société Provençale de Constructions Aéronautiques* (SPCA) at Marseille and Lioré et Olivier at Argenteuil, near Paris, and Marignane — SNCASE

PHILIPPE RICCO COLLECTION

ABOVE ***Built as an aerodynamic test article for the development of the SE.100, the LeO 48 incorporated the same distinctive curved fuselage and tapered wing planform, but retained a conventional tailwheel undercarriage. The sole prototype did not fly until November 21, 1941, and was written off in a landing accident on February 5, 1942.***

became the largest of the individual regional organisations, with more than 2,500 employees, a quarter of the nation's aircraft manufacturing workforce at the time. The vast majority of SNCASE's staff, some 1,700 skilled workers, were erstwhile Lioré et Olivier employees, and it was LeO that contributed the lion's share of SNCASE's initial manufacturing contracts.

TOWARDS WAR

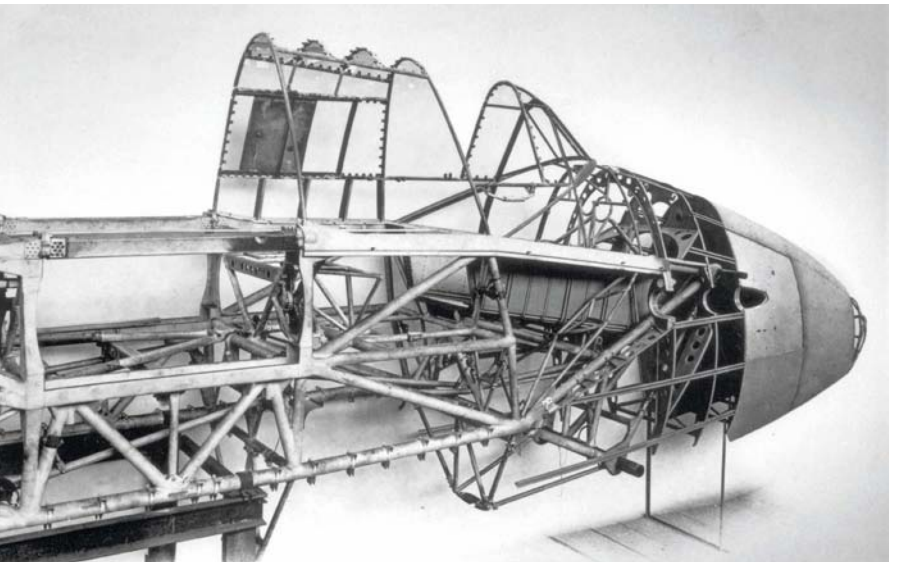
The former director of LeO, Louis Arène, was appointed to lead SNCASE, each of the regional groups' directors receiving an annual salary of 300,000 francs; not a king's ransom, but they would be spared the burden of financial risk and the tedious business of organising the payroll and raising capital, which would fall to the government. The companies were allowed to earn a ten per cent profit over production costs, with additional profits going back into factory improvements and social programmes for the company's employees.

On February 1, 1937, SNCASE was officially established, the company's first objective being to complete the various projects being developed by LeO before nationalisation. These were:

- the SE.100 twin-engined twin-finned fighter-bomber aircraft;
- SE.200 six-engined 20-passenger transatlantic flying-boat;
- SE.300 Romano-derived three-seat twin-engined light observation aircraft;
- SE.400 twin-engined coastal patrol/reconnaissance floatplane;
- SE.500 twin-engined twin-boom bomber derived from the SE.100;

The prototype at Villacoublay, to where it was transported from Argenteuil for flight testing. It was intended that the somewhat over-engineered and unexpectedly fragile nosewheel would be replaced with a simpler mechanism on production aircraft.

TAH ARCHIVE



LEFT ***The SE.100 was designed to be constructed from non-strategic materials as much as possible, with a metal frame providing the skeleton for a specially designed rigid plywood skin arrranged in easily demountable panels for easy access.***
PHILIPPE RICCO COLLECTION

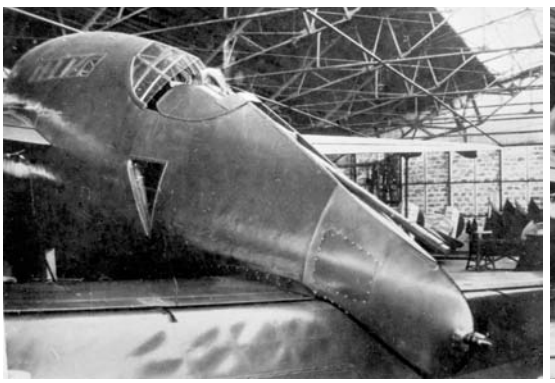
BELOW ***The sharply curved rear fuselage of the SE.100 incorporated a channel in which the barrel of the 20mm Hispano-Suiza HS.404 cannon could be accommodated when not in use. The photograph on the right shows the cannon and gun position when extended.***

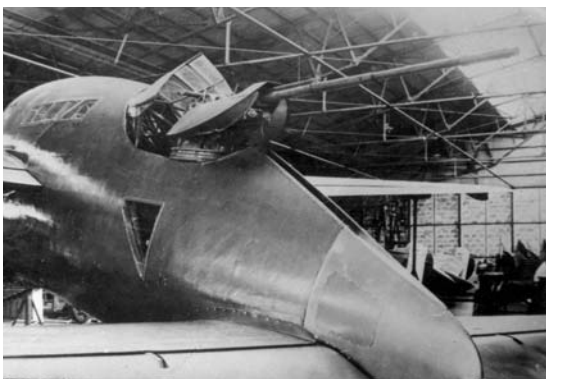
■ SE.600 two-seat single-engined armed reconnaissance monoplane.

The first of these, the SE.100, was a continuation of Mercier and Lecarme's LeO 50 design to a 1934 specification for *Avions de Commandement á la Chasse* (Fighter Command Aircraft), the pair ably assisted by the prototype-construction foreman at Argenteuil, engineer Louis Marnay. The concept of a twin-engined three-seat heavily-armed ground-attack fighter was very much in tune with the aims of Plan V, an ambitious new French programme for building state-of-the-art military aircraft, unveiled by Air Minister Guy La Chambre on March 15, 1938, a mere three days after Germany's annexation of Austria.

Time was clearly of the essence, and the demanding plan called for up to 2,500 new aircraft for the front line and more than 2,000 in reserve. Crucially, the aircraft had to be thoroughly modern and able to compete against the best that France's prospective enemies could field. A top speed of more than 500km/h (310 m.p.h.) was specified, along with the need for cannon armament, modern radio equipment and a retractable undercarriage. If France was to offer any resistance at all, politically or militarily, to Hitler's growing appetite for territory, its aircraft industry would have to ramp up production to a level many times greater than that of any previous plan. Even if Plan V could be completed by April 1940, as hoped, the nation's air force would still be small in comparison to the mighty Luftwaffe, but it was felt that the British could be prevailed upon to supply tactical support, particularly the use of bombers, should the need arise. As a direct result, French fighter production was made a priority, with the implementation of specifications for a *Bombardier d'Assaut Bimoteur Biplace ou Triplace* (twin-engined two- or three-seat bomber/ground-attack aircraft or AB2/3) and a *Chasseur Triplace* (three-seat fighter, known as C3).

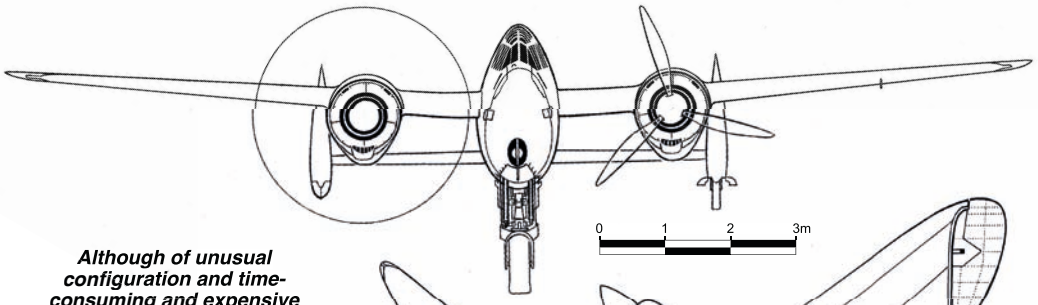
A number of designs were put forward to the C3 specification, including the Hanriot H.220/NC-600, two examples of which were ultimately built by SNCAC; the Potez 671, of which only one example was built; the sole Breguet 700 and the Loire-Nieuport LN-20, which never flew. While these designs were broadly conventional



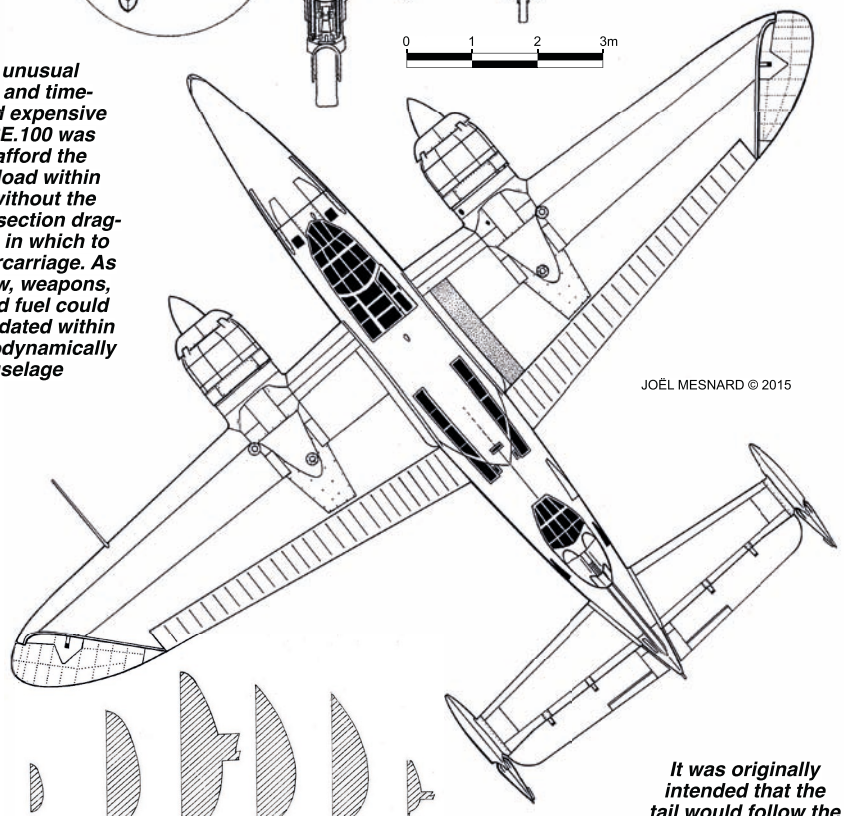


PHILIP JARRETT COLLECTION

SNCASE SE.100 scale drawings by Joël Mesnard

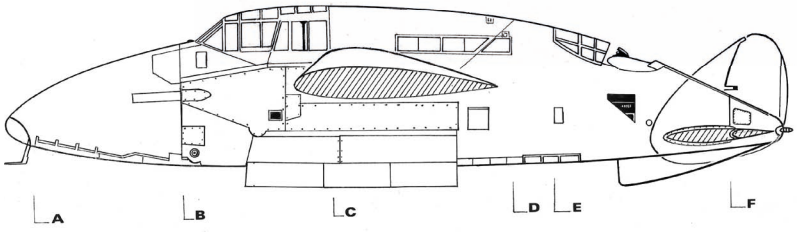


Although of unusual configuration and time-consuming and expensive to build, the SE.100 was designed to afford the maximum payload within the fuselage without the penalty of thick-section drag-inducing wings in which to house the undercarriage. As a result the crew, weapons, ammunition and fuel could all be accommodated within the narrow, aerodynamically efficient fuselage

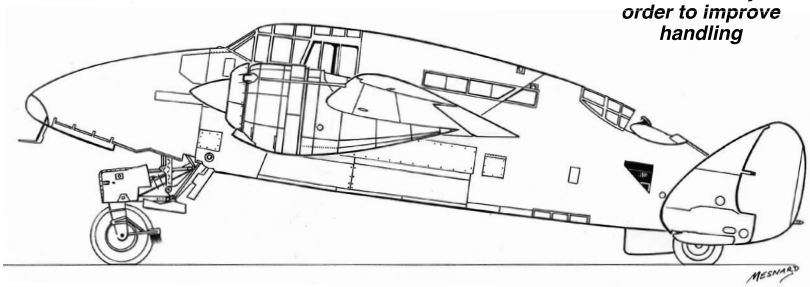


The SE.100's trapezoidal wing incorporated 10° dihedral and was fitted with unusual diagonally-positioned ailerons forming the rounded wingtips

It was originally intended that the tail would follow the form of the wooden wing but the four fin variations test-flown on the SE.100 were all of light-alloy construction. The closed undercarriage doors in the fins formed an aerodynamic fairing. A ventral fin beneath the empennage was fitted during tests at Villacoublay in order to improve handling



The prototype's steerable 950mm x 335mm (37in x 13in) nosewheel was equipped with Messier brakes. The nose doors opened only to allow the nosewheel to lower or retract



PHILIPPE RICCO COLLECTION

LEFT ***Groundcrew prepare the prototype for a test flight at Villacoublay, from where the aircraft made 33 flights, all in the hands of Louis Rouland, between March and December 1939.***

BELOW ***Variations on a theme — applying the same unusual undercarriage arrangement, the influence of the SE.100 on the SE.700 autogyro is clear. Built during the war, the type had to wait until May 1945 to make its first flight, but was grounded in January 1946.***

twin-engined fighters, Mercier and Lecarme took a more radical approach.

Of essentially conventional construction, the SE.100 combined a chrome-molybdenum steel-tube fuselage with a wooden wing structure, the latter based on that of Mercier's previous LeO 48 design. The banana-shaped fuselage was extremely short, however, and the wings incorporated unusual diagonally-mounted wingtip ailerons, which allowed for full-length flaps along the trailing edge, intended to give the aircraft short take-off performance and favourable low-speed flight characteristics.

The empennage was also unorthodox, the small mainwheels of the tricycle undercarriage retracting into recesses incorporated into the lower halves of the twin fins. The stocky, curved fuselage and low-set fins allowed for an extremely wide arc of defensive fire for the rear-facing hydraulically-mounted 20mm cannon. For power the SE.100 was equipped with a pair of Gnome-Rhône 14N radial engines, the ubiquitous French powerplant.

The SE.100's *pièce de résistance*, however, was to be its armament; it was proposed that the ground-attacker could accommodate a battery of up to ten guns, including six forward-firing Hispano-Suiza HS.404 20mm cannon mounted in the long nose, a single HS.404 and two 7·5mm (0·3in) machine-guns in a ventral gondola and another HS.404 facing rearwards at the back of the cabin where the fuselage curved downwards. Weight may presumably have presented something of a problem with this bristling configuration, but whether it was ever tested remains unlikely.

FIRST FLIGHT

Cutting metal began on the SE.100 at the former Lioré et Olivier factory at Argenteuil, a north-western suburb of Paris, in 1938, and by March 1939 the completed airframe was ready to make its maiden flight. At the same time, Hitler's Wehrmacht was occupying all the remaining parts of Czechoslovakia not ceded to Germany as part of the previous year's Munich

TAH ARCHIVE

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Agreement. What had been a pressing matter previously now became an urgent crisis — Chief of Staff of the French Air Force Général Joseph Vuillemin informed Air Minister La Chambre that as things stood he could offer, at best, approximately 700 obsolescent aircraft against some 2,500 Luftwaffe aircraft should it come to a defensive battle. British Prime Minister Neville Chamberlain may or may not have made the right decision to appease Hitler at Munich, but the French had little choice but to agree to it and rearm as swiftly as possible.

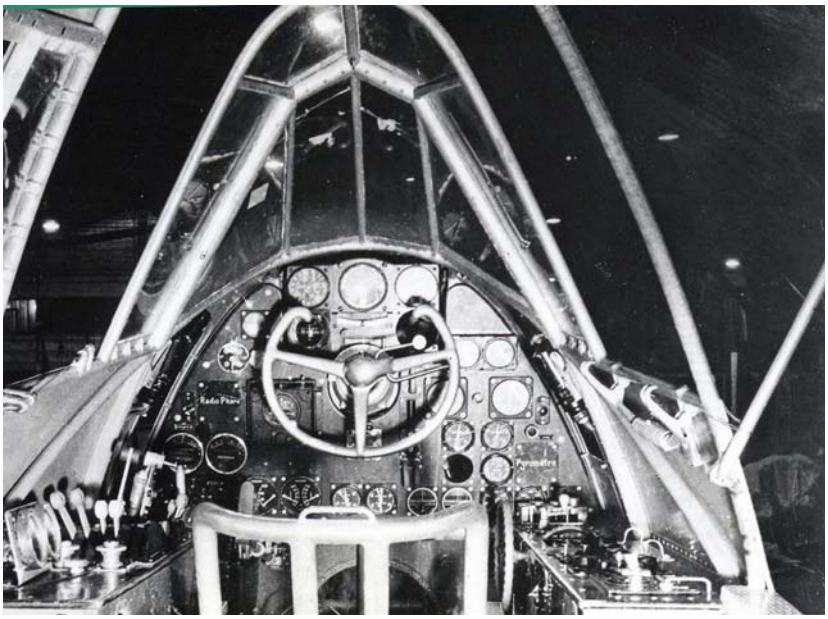
By the end of March 1939 the prototype SE.100 had been moved to the airfield at Villacoublay, a few miles south-west of Paris, in preparation for its first flight, which would be made by test pilot Louis Rouland, accompanied by Jacques Lecarme. On March 29 the pair climbed aboard the unconventional aircraft, which weighed in at some 7,000kg (15,400lb), and took off on the first test flight, causing some unease among the staff at the airfield when the aircraft disappeared from sight and failed to return for some 45min. Rouland and Lecarme were in fact enjoying themselves, and later reported that they had taken the aircraft for a tour of the *région Parisienne*. Lecarme was extremely impressed with the aircraft's performance, and particularly its engines, stating that he had never flown an aircraft with a greater feeling of power.

As German forces began to mobilise on the Polish border and the inevitability of France being dragged into a European war became impossible to ignore, the government placed an order for 300 SE.100s, which, according to some sources, were to have been built by Citroën at its Clichy and Levallois factories in Paris. Air Minister La Chambre, realising France's weak position with regard to air power, had also sent Senator Amauny de la Grange to the USA the previous year to explore the possibility of purchasing up to 1,000 American fighter aircraft to fill the gap.

Although the American President, Franklin D. Roosevelt, was keen to help, his hands were tied by the Neutrality Act of 1935. The best that

TOP ***A poor-quality but rare photograph of the SE.100 in flight. It is seen here on finals into Villacoublay, with undercarriage and generous flaps lowered.*** **BELOW** ***Running up the engines at Villacoublay; the prototype underwent numerous changes during its early flight-test programme, including engine changes and the fitting of various propeller units.***

F. LENFANT VIA PHILIPPE RICCO



TAH ARCHIVE

LEFT ***The view from the SE.100's cockpit was good in all aspects, the pilot being seated high and far forward of the wing's leading edge. The layout of the instruments was busy but no more so than in any of the type's contemporaries; indeed, Mercier and Lecarme were early advocates of ergonomic design.***

BELOW ***On December 9, 1939, the SE.100 prototype was flown to Marignane, near Marseille in the south of France, where it was put into a camouflage colour scheme. The canopy and wings were modified and the aircraft restarted its flight test programme on January 4, 1940.***

de la Grange could manage was an initial order for 100 Curtiss Hawk 75s, which entered Armée de l'Air service in the spring of 1939. Meanwhile, the construction of another SE.100 prototype was put in hand at Argenteuil.

On May 9, 1939, Rouland took the first prototype aloft at Villacoublay to test single-engine climb performance, with Lecarme, Mercier and Nicolas on board. Reportedly, the aircraft displayed little difficulty in reaching 20,000ft (6,100m) on one engine at an all-up weight of more than seven tons. A second flight of 15min was made later the same day, this time with SNCASE President Louis Arène aboard. On December 9, Rouland flew the prototype to Marignane with passengers Cornu and Lecarme, the 400-mile (645km) flight taking 1hr 40min at an average speed of 241 m.p.h. (388km/h). Contrary to some reports, the aircraft never returned to Paris.

On April 5, 1940, Louis Rouland and mechanic André Vuagnoux were on a test flight of the first prototype when the control mechanism on the port propeller failed. The aircraft became uncontrollable and crashed, killing both occupants. It was a serious setback, and within six weeks the Fall of France had begun, with German armoured units pushing through the Ardennes and along the Somme valley to cut off Allied units in Belgium.

WHAT MIGHT HAVE BEEN . . .

Although the Allied air forces were numerically superior to the Luftwaffe in terms of fighters, and had larger reserves of aircraft, in large part thanks to the efforts of the French aircraft industry and Plan V, spares were cripplingly short and only a third of the Allies' aircraft were sufficiently serviceable to be able to participate in France's struggle for survival.

Crucially, the Allies lacked an effective ground-attack aircraft which could have seriously hampered German motorised column movements, particularly in the Ardennes, where

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During January—April 1940 the SE.100 was extensively tested at Marignane. At the end of March the engines were swapped to counter-rotate outboard, as opposed to inboard, as had been the case to that point. Sadly, Louis Rouland and mechanic André Vuagnoux were killed when the aircraft crashed near Crau on April 5, 1940.

Paul von Kleist's Panzergruppe, made up of more than 40,000 vehicles, was negotiating its way through the poor road network and rough forest terrain. Had the multi-cannon-armed SE.100 been available in numbers, it may have made short work of these sitting-duck targets and significantly delayed, if not halted, von Kleist in his tracks. It may have been as important to the French as the Junkers Ju 87 Stuka had been to the Luftwaffe during Germany's recent territory-grabbing adventures.

As it was, the prototype SE.100 had been destroyed and the second was not yet completed. Despite the heroic efforts of the Armée de l'Air, which destroyed more than 900 Luftwaffe aircraft in air combat during the Battle of France (a third of the French kills were by American Hawk 75s, which represented less than 15 per cent of the Armée de l'Air's single-seat fighters), German forces marched into a virtually undefended Paris on June 14, 1940. A week later a formal armistice was signed and France fell under the yoke of Nazi Germany.

The second prototype, nearing completion in June 1940, never flew and was eventually scrapped at Argenteuil in 1942. The Gnome-Rhône engines being built for the prospective SE.100 production line were tested by the Germans and found to be worthy of continued production. These went on to power a number of Luftwaffe types, perhaps most ironically the heavily-armoured Henschel Hs 129 tank-buster — which, although built in comparatively small numbers, proved deadly on the battlefield against Soviet tanks. Whether the peculiar but potentially devastating SE.100 would have been equally as effective against the German offensive in 1940 will never be known.

SNCASE SE.100 DATA

Powerplant 2 × 1,080 h.p. Gnome-Rhône 14N-20/21 14-cylinder air-cooled two-row radial piston engines (Gnome-Rhône 14N-48/49 from 20.1.40) initially driving three-bladed propellers of 3·3m (10ft 10in) diameter. Initially Ratier propellers were fitted, but these were replaced by Gnome-Rhône units. Chauvière propellers were also used in trials. Gnome-Rhône 14R-4/5s were also proposed, as were Rolls-Royce Merlins, but neither were ever fitted

Dimensions		
Span	15·70m	(51ft 6in)
Length		
(fuselage)	11·75m	(38ft 6in)
(overall)	11·80m	(38ft 8½in)
Height		
(tail up)	4·28m	(14ft 0½in)
Wing area	31m²	(334ft²)
Maximum weight (3.40)	7,400kg	(16,315lb)
Performance		
Max speed	580km/h at 6,500m	(360 m.p.h. at 21,300ft)
Cruise	499km/h	(310 m.p.h.)
Range	1,300km	(810 miles)

Armament
Up to 6 x 20mm forward-firing Hispano-Suiza HS.404 cannon or 2 x HS.404 + 5 x 7·5mm MAC 1934 machine-guns (nose battery); 1 x 20mm HS.404 cannon (dorsal canopy); 2 x 7·5mm MAC machine-guns or 1 x 20mm HS.404 (ventral hatch)

ACKNOWLEDGMENTS *The Editor would like to thank French aviation historian Philippe Ricco and illustrator Joël Mesnard for their invaluable help with the preparation of this feature*

THE LIGHT BRIGADE

Having made its fortune as a manufacturer of lightbulbs, Dutch electronics company Philips was an early adopter of the concept of a fleet of corporate aircraft, thanks to the airmindedness of Vice-Director Frits Philips, who acquired the company's first aircraft in 1935. **TOM SINGFIELD** relates how Philips used its innovative *Vliegdienst* — aircraft fleet — to save both time and money

VIA AUTHOR

This way for savings in time, money and executive stress — a promotional photograph of the Philips Vliegdienst base at Eindhoven in 1969, including Fokker F-27 PH-LIP, which served the company with distinction during 1962–75, and Beech King Air PH-ILK, one of two operated by Philips during the 1970s and 1980s.

THE WORLD-FAMOUS Koninklijke Philips company, based in Eindhoven in The Netherlands, traces its heritage back to 1891, when it was founded to meet the growing demand for incandescent lightbulbs following the commercialisation of electricity. Within a few years the company had become the world's largest producer of electric lightbulbs.

In October 1935 Frederik Jacques "Frits" Philips, son of co-founder Gerard, was appointed to the board of the expanding electronics company as Vice-Director. In celebration, he bought a two-seat Koolhoven F.K.46 (c/n 4606), which he put on the Dutch civil register as PH-LPS, the first of the Philips fleet to carry this distinctive registration. Frits became a keen private pilot and flew the Koolhoven regularly. In October 1949 he decided to acquire another aircraft, this time a new Auster J/1 Autocrat (c/n 1845), which was also allocated the registration PH-LPS. He kept this until 1953 when a new Cessna 170B (c/n 25993), this time registered to the Philips company, took over the registration. Frits's original Auster survived and is now preserved in its Philips livery at the Aviodome at Lelystad as PH-NFH.

A CORPORATE AIRCRAFT PIONEER

For centuries The Netherlands had relied upon worldwide international trade, and with transport for the Philips salesmen and executives becoming ever more expensive — and not always speedy or convenient — Frits could see that a company-owned aircraft was the way forward. Accordingly, he told the board that an aircraft "would save the health of our staff employees", and eventually persuaded the somewhat doubtful board that an executive Beech 18 would be an ideal choice. Frits set about obtaining such a machine in 1954.

Beech E18S N3600B (c/n BA-6) was less than a year old when it was registered to NV Philips Gloeilampenfabrieken and delivered to the company base at Eindhoven via Prestwick on May 7, 1955. The handsome twin was originally allocated the registration PH-NFU, but it was decided that the new aircraft would take the registration PH-LPS from the Cessna 170B, the latter being re-registered as PH-NFU.

Philips employed a retired RAF pilot officer, the exotically-named Splinter Adolphe Spierenburg, to fly the Beech and run the aviation enterprise. Born in The Hague in 1920, Spierenburg joined the RAF in 1942 and flew Short Stirlings and Avro Lancasters. He was shot down over France in Lancaster III ND921 of No 582 Sqn on June 28, 1944. He survived the crash landing and managed to avoid capture until July 14, when he was discovered in Paris. He was sent to Buchenwald forced-labour camp near Weimar, where his fluent German enabled him to become the interpreter between Phil Lamason, the senior RAF officer, and the camp authorities. One of 168 Allied airmen unlawfully kept at Buchenwald, he became a member of the famous *Konzentrationslager Buchenwald* (KLB) Club.

PHILIPS VIA AUTHOR

ABOVE ***Splinter Adolphe Spierenburg, first pilot and manager of the Philips corporate fleet. He explained his rationale thus: "The business aircraft must be seen as a time-producing machine, time being one of the most precious possessions of mankind; why squander a good man's time on inefficient means of travelling?"***

The brief given to Spierenburg by Philips stipulated that the company's air operations had to satisfy three basic requirements — safety, economy and comfort. The latter in this context was not intended to imply a "deluxe" service, but rather the well-being of staff which arises from the saving of time and energy.

Operations with the Beech commenced on October 1, 1955, and for the first year Spierenburg ran the outfit virtually single-handedly, although there was a ground engineer who flew with him while being trained as a flight engineer and radio operator. Early in-flight catering consisted of sandwiches made by Spierenburg's wife on the morning of departure. In the first year, the Beech flew 259 hours and carried 150 passengers, at a cost of approximately £50 per flying hour. By 1957 the operation boasted two captains, one copilot, three engineers and a secretary. Their combined salaries amounted to £9,000.

The Beech 18 remained in Philips service for an impressive ten years before it gave up its special

PJM COLLECTION

ABOVE ***Philips's long-serving Beech E18S PH-LPS at Croydon in the late 1950s. The fleet's distinctive dark-green and white horizontal stripes were later added to the twin's rudders. It is now preserved in Malaga as EC-ASJ; confusingly, the same registration is used by the*** **Fundaçion Infante de Orleans'** ***airworthy Beech 18 at Madrid.***

marks to a Dassault Falcon 20 business jet. Over that decade the attractive twin-engined Beech made numerous trips around Europe with many flights to the UK, particularly into Gatwick (where it was first noted on June 15, 1959) and Cambridge, where Philips had an interest in the British radio company Pye.

GROWING THE FLEET

Once the concept of a company aircraft had been accepted by the board, *Philips Vliegdienst* (Philips Aircraft Service) grew quickly and additional aircraft were obtained. First to be acquired was a brand new twin-engined de Havilland D.H.104 Dove 6 (c/n 04493), which was registered to Philips on July 29, 1957, as PH-ILI.

This was followed by a four-engined D.H.114 Heron 2E, PH-ILA (c/n 14104), acquired from British aviation agent W.S. Shackleton in January 1959, previously operated by Cambrian Airways as G-AORJ. Clearly pleased with the performance and reliability of de Havilland's products, Philips acquired another Heron in the shape of Series 2C (2D from 1963) PH-ILO (c/n 14094), which arrived at Eindhoven in 1960. A familiar sight at European airports, 'ILO had previously been used as an executive transport by Shell UK as G-AOGC.

The Philips fleet initially flew in a variety of colour schemes until the mid-1960s, when a corporate scheme was adopted consisting of a dark-green cheat line, alternate horizontal dark-green and white (sometimes grey if the fuselage underside was grey) stripes on the rudder, together with the famous Philips logo.

As capacity demand grew for the Philips European executive "milk runs", which were to all intents and purposes scheduled flights, the company decided to buy a larger aircraft in the

Although similar in terms of passenger-carrying capacity, the de Havilland Dove was an altogether more modern proposition than the Beech 18. Philips acquired its first Dove, PH-ILI, in 1957, the aircraft remaining in Vliegdienst service until 1967.

PJM COLLECTION

PHILIPS VIA AUTHOR

ABOVE ***Capable of carrying 14 pasengers and two crew, the de Havilland D.H.114 Heron was a four-engined "stretched" version of the Dove, offering even better economics. Heron 2E PH-ILA was acquired by Philips in early 1959 and served until 1968, when it went to the USA to become N561PR and was fitted with Continental engines.***

shape of a new Fokker F-27 Mk 100 Friendship (c/n 10198). This was registered PH-LIP in May 1962, and within days was busy working on the Eindhoven—London (Gatwick) and Eindhoven—Hamburg services. These services rapidly became extremely busy and tied up aircraft that were sometimes needed at short notice, so Philips encouraged Dutch domestic airline NLM (*Nederlandse Luchvaart Maatschappij* – a subsidiary of KLM) to take over the routes and operate them as scheduled passenger services. Accordingly, NLM's Eindhoven—Hamburg route started in April 1974 with Friendships, becoming the subsidiary's first international service. Fokker F-28 Fellowship jetliners took over from 1978. NLM's Eindhoven—Gatwick service (NLM also being known as NLM CityHopper) was launched on February 3, 1975, using F-27 PH-KFG.

The Philips Friendship was usually fitted with underwing fuel tanks, which allowed it to make non-stop flights from Eindhoven to Cairo. Following its withdrawal from the NLM routes PH-LIP received a corporate makeover and was put into a scheme incorporating a white fuselage, pale-blue cheatline and larger company titles. It was eventually sold in Germany in 1975 after 13 reliable and cost-effective years.

WHEN IS AN AIRLINE NOT AN AIRLINE?

By this time Philips accountants had worked out that the Vliegdienst's aircraft fleet had saved the company just short of £2 million per year in travel costs, hotels and staff time. The actual cost of the whole operation was a similar amount, so Philips could justifiably claim that the whole operation was practically cost-neutral.

The piston-powered fleet continued to grow

Continued on page 116

In the early 1960s Philips also began adding smaller twins to its roster, and in 1963 Beech Baron PH-ILP joined the fleet, only to be re-registered PH-ILB, as seen here, in 1967, to avoid callsign confusion with F-27 PH-LIP.

HENDRIK CAZEMIER

BOB WALL COLLECTION VIA AUTHOR

ABOVE *Fokker F-27 Friendship PH-LIP was the centrepiece of the Vliegdienst from its acquisition in 1962, and, with its auxiliary wing-mounted fuel tanks, could comfortably manage long-range flights from Europe to the Middle East. The aircraft was sold in 1975 to become D-BAKA and was later operated by DLT and Crossair.*

BOB WALL COLLECTION VIA AUTHOR

ABOVE *Seen here wearing the standard Philips colour scheme of a dark-green cheat line, white upper surfaces, bare-metal or grey lower fuselage and undersides, green-and-grey striped rudder and dark-green engine detail, piston-engined Beech Queen Air 65 PH-ILS was a regular visitor to the UK during its eight-year Vliegdienst service.*

TOM SINGFIELD COLLECTION

ABOVE *In 1967 Philips joined the jet set with the acquisition of a Dassault Falcon 20C, which would become the fifth of the company's aircraft to wear the registration PH-LPS. After nearly two decades in Vliegdienst service, the Falcon was sold to a new German owner as D-CBNA in February 1986, and crashed in Greenland in April 2001.*

KONINKLIJKE PHILIPS VLIEGDIENST FLEET 1949–2015

IN TOTAL, 29 different aircraft have been operated by *Koniklijke Philips Vliegdienst* since 1935. The aircraft are listed below in alphabetical order of registration. Previous and post-Vliegdienst identities are included

Reg'n	Type	c/n	Operated	Comments
PH-FJP	Grumman G-1159 Gulfstream II	78	1970–71	Ex N17585. To CF-IOT, C-FIOT, N90HH, HP-1A
PH-FST	de Havilland D.H.104 Dove 6	04510	1970–71	Ex G-5-12. To G-BBYA, SU-AZQ
PH-FSW	Agusta-Bell 206A JetRanger	8056	1975–80	To G-BHSG
PH-ILA	de Havilland D.H.114 Heron 2E	14104	1959–68	Ex G-AORJ. To N561PR
PH-ILB	Beech 95-A55 Baron	TC-501	1967–73	Ex D-ILDY, PH-ILP. To N5AN
PH-ILC	Dassault Falcon 900B	161	1999–Current	Ex F-WWFF, F-GSAB, VP-CTT, G-GSEB
PH-ILD	Dassault Falcon 50	23	1983–98	Ex F-WZHG, D-BBAD, D-BBWK. To N725PA, N821BS, N523CW, N523PB
PH-ILE	Beech 95-A55 Baron	TC-220	1965–71	Ex HB-GOV. To G-BFLZ
PH-ILF	Dassault Falcon 20C	444	1968–94	Ex D-CORT. To N665P, N244FJ, LV-BIY
PH-ILG	Beech 200C Super King Air	BL-13	1980–91	To OY-JAR, C-FGPC, N817BB, C-GCVS
PH-ILH	Beech 200 Super King Air	BB-737	1980–88	To F-GHLC, N38GM, N703X, N767LD, N867LD
PH-ILI	de Havilland D.H.104 Dove 6	04493	1957–67	To OO-WIP, 6V-ACL
PH-ILK*	Beech 90 King Air	LJ-4	1968–73	Ex N790K, HB-GCI. To F-BUFI, TR-LBB, F-GDRT
PH-ILO**	de Havilland D.H.114 Heron 2C (later 2D)	14094	1960–67	Ex G-AOGC. To N17600, N572PR
PH-ILP***	Beech 95-A55 Baron	TC-501	1963–67	Ex D-ILDY. To PH-ILB
PH-ILR	Dassault Falcon 50	15	1980–99	Ex F-WZHM. To N350JS
PH-ILS	Beech 65 Queen Air	LC-48	1964–72	Ex D-ILSA. To OO-NJP, OO-JPN, N40SB
PH-ILT	Dassault Falcon 10	1	1978–80	Ex F-WSQU, F-BSQU. To F-WJLH, F-BJLH, N333FJ
PH-ILX	Dassault Falcon 20E	266	1972–94	Ex F-WRQR. To N4115B, N184GA
PH-ILY	Dassault Falcon 20E	326	1975–94	Ex F-WRQQ. To TC-CEN, TC-GGG
PH-IND	Beech 65-A90 King Air	LJ-285	1970–81	Ex N6789, N6788. To N98HB
PH-IPS	Cessna 182B	52027	1959–63	To LX-PHD
PH-LIP	Fokker F-27 Mk 100 Friendship	10198	1962–75	To D-BAKA
PH-LPS† (2)	Taylorcraft Auster J/1	1845	1949–52	Ex PH-NAA. To PH-NFH
PH-LPS (3)	Cessna 170B	25993	1953–55	Ex N11B. To PH-NFU
PH-LPS (4)	Beech E18S	BA-6	1955–65	Ex N3600B. Preserved as "EC-ASJ" at Malaga
PH-LPS (5)	Dassault Falcon 20C	63	1967–86	Ex F-WMKI. To D-CBNA

Notes

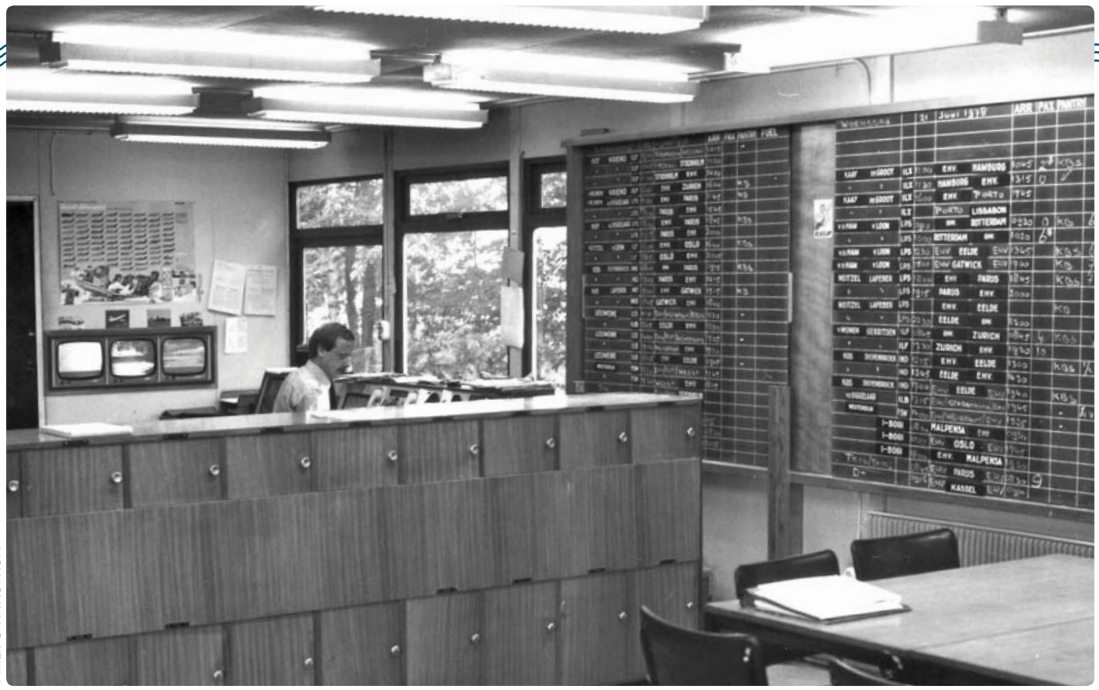
***** As N790K, this was Beechcraft's European demonstration aircraft, as which it was shown to McAlpine Aviation and Martin-Baker. During its tenure with Philips it was operated in association with Eindhoven-based DAF Autos

****** PH-ILO was originally reserved for a Dove 6

******* PH-ILP was re-registered as PH-ILB in 1967 owing to callsign confusion with PH-LIP

† PH-LPS (1) was Koolhoven F.K.46 c/n 4606, owned by Frits Philips during 1935–37. It became PH-APM and was written off in 1940

Beech 65-90 King Air **PH-FSS** (c/n LJ-32) was owned by *Vliegsyndicaat Twenthe* (Twenthe Flying Syndicate) but also flew for Philips in the company's colours. Dove PH-FST was also borrowed from this group before its acquisition by Philips in September 1970



PHILIPS VIA AUTHOR

ABOVE ***The Philips Vliegdienst operations room at Eindhoven in June 1978. On the board for the day's flights are Falcon 20s PH-LPS, 'ILF, 'ILX and 'ILY, Beech King Air PH-IND, Baron PH-ILB and Bell JetRanger PH-FSW. "Milk run" flights were essentially scheduled services, but had to be at least half-full and completed within one day.***

Continued from page 113

throughout the 1970s with Dove 6 PH-FST (c/n 04510) joining in September 1970 for a year, although it had previously been borrowed from its owner, *Vliegsyndicaat Twenthe* (the Twenthe Flying Syndicate), as required.

The first of several corporate jets arrived in the shape of a Dassault Falcon 20C (c/n 63) in 1967. This became the fifth PH-LPS, the long-serving Beech 18 having been sold to a new owner in Morocco in 1965. The Beech is currently preserved as "EC-ASJ" at the *Museo Naçional de Aéropuertos Transporte Aéreo* at Malaga in southern Spain. Philips did not desert Beechcraft, however, and acquired a Queen Air and several Barons and King Airs, thereby becoming Europe's largest operator of corporate aircraft during the 1970s.

In 1974 the Philips flight department's 71 staff, controlling six aircraft and a Bell JetRanger helicopter, notched up some 5,450 hours of flying time, during which 25,000 employees were flown to 262 airfields around Europe. In addition, Philips fulfilled annual commitments for four intercontinental flights to Africa, the Middle and Far East and Australia.

Aircrew training was undertaken "in-house", with the fixed-wing aircrew being rated on several types and the rotary-wing pilots also maintaining their competence on fixed-wing types. There were 210 senior Philips staff, known as "Trip Originators", who could order the use of a company aircraft, although intercontinental flights could only be authorised by the management board.

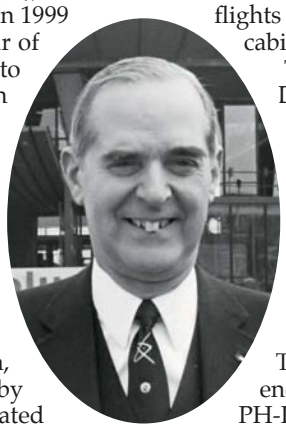
Wearing only the Philips company logo to mark its ownership, Dassault Falcon 10 PH-ILT, awaits another Vliegdienst flight. Despite the inverted numbering sequence, the Falcon 10 was in fact a development of the larger Falcon 20.

HENDRIK CAZEMIER

JOE McDERMOTT VIA AUTHOR

ABOVE ***Delivered new to Philips in 1949, this Taylorcraft Auster J/1 Autocrat flew with the company for four years as PH-LPS, taking the registration from the first Philips aircraft, Frits Philips's Koolhoven F.K.46. As seen here, the Auster has been preserved in its original Philips livery and is currently on display at the Aviodrome in Lelystad.***

In 1977 Splinter Spierenburg retired after 23 years of Philips service, and Frits Philips established the International Business Aviation Association (Europe) in Eindhoven with 12 founding members. In 1984 the IBAA became the European Business Aviation Association (EBAA), which now boasts more than 500 members. In 1999 Frits was named "Dutch Entrepreneur of the Century" and on April 5, 2005, to mark his 100th birthday, Eindhoven was officially renamed "Frits Philips Stad" for the day.



RADICAL DOWNSIZING

By 1985 the Philips fleet, which had flown without accident for 30 years, consisted of two Dassault Falcon 50s, four eight-seat Falcon 20s and two Beech 200 Super King Airs. Since 1978 a Falcon 20 had been based at Riyadh, the capital of Saudi Arabia, for use by Philips and Ericsson staff. This was rotated with another Falcon 20 every three weeks.

In 1984 the Vliegdienst's fleet of eight aircraft had flown some 12,000 passengers. Indeed, the company's regular runs to Vienna, Zürich and Milan were considered busy enough for the company's Aviation Director, Wim Hoffland, to propose that the routes should be adopted by an airline for scheduled services. Accordingly, the twice-daily Falcon 20 service to Vienna was taken over by NetherLines using BAe Jetstream 31 turboprops. The long-range Falcon 50s were used for flights to Eastern Bloc countries, the Far and Middle East and Africa, as well as transatlantic flights, during which they would refuel at Newfoundland on the westbound leg, but fly non-stop from New York to Eindhoven in less than 7hr on flights back to Europe. Four seats in the rear cabin could be converted to two beds.

The company was impressed with Dassault aircraft and in 1996 ordered a new Falcon 900, to be registered PH-ILC (c/n 9). The order was never fulfilled, however. By late 1996 the aviation operation was struggling with just two Falcon 50s, and the company was keen to sell off the enterprise. No buyer was found, so one Falcon was sold and 13 of the 23 staff were laid off.

The Vliegdienst was not yet at an end, however. In 1999 the registration PH-ILC was activated when Dassault Falcon 900 c/n 161 arrived at the company's Eindhoven base. In 2015 this is the only aircraft in the Philips fleet, operated through Jet Management Europe BV. Despite the radical slimming-down of the Philips fleet in recent times, the company retains its well-deserved reputation as a pioneer in the use of corporate aircraft, largely thanks to the vision of Frits Philips (**INSET ABOVE**), who died in 2005 at the grand old age of 100.

ARMCHAIR AVIATION

We take a look at what's available for the aviation history enthusiast in the world of books and other literature, from hot-off-the-press publications to reissued classics

Commanding Far Eastern Skies: A Critical Analysis of the Royal Air Force Air Superiority Campaign in India, Burma and Malaya 1941–1945

By Peter Preston-Hough; Helion & Co Ltd, 26 Willow Road, Solihull, West Midlands B91 1UE; 6½in x 9½in (165mm x 241mm); hardback; 307 pages, illustrated; £29.95. ISBN 978-1-910294-44-4

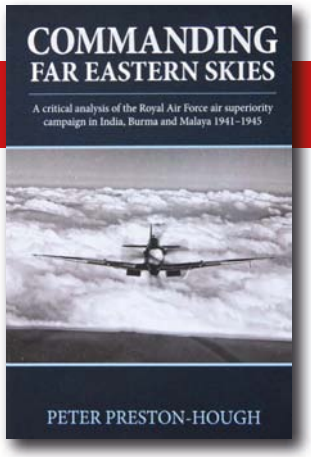
IN THIS NEW book on the air war over Burma, Peter Preston-Hough has made a significant contribution to the literature on this long-neglected air campaign. Air superiority was vital to the success of the Fourteenth Army's advance into Burma during 1944–45; no other Allied army was so dependent on air supply. How the RAF lost air superiority over Malaya and Burma in 1942 and regained it over Burma during 1944–45 is the subject of this excellent study.

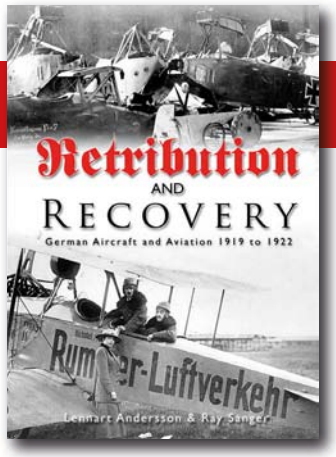
The author begins his study with an examination of the often-neglected subject of the early-warning systems that are critical to air defence. With its low priority for equipment, the Far East (Burma, India, Malaya and Singapore) lacked an adequate early-warning system when the Japanese launched their attacks on December 8, 1941. Using primary sources from The National Archives, the author describes how the RAF built an effective early-warning system in India through many trials and tribulations, both technical and organisational, in an exceptionally demanding climate and terrain. This is an aspect of the air war over Burma that has not been covered before. As he points out, if the early-warning system had not been functioning, the arrival of Spitfires in theatre in late 1943 would have had less of an impact on the air war. The system played a critical role in the defensive battles over the Arakan and Imphal during 1944 and the subsequent advance into Burma in 1945.

Having covered the defensive aspects of the air war, the author begins his study of the campaign for air superiority by examining the aircrew, aircraft and tactics of the rival air forces, comparing and contrasting the RAF and US Tenth Air Force with their Imperial Japanese Army Air Force (IJAAF) counterparts. He makes effective use of memoirs of pilots who fought the Japanese over Burma, Operational Record Books and official RAF records from the period. His coverage of the development of Allied air tactics is particularly informative. He then moves to the counter-offensive air campaign, describing the difficulties RAF Hurricanes had during 1942–43 against the more nimble Japanese fighters.

The arrival of the Spitfire gave the RAF superiority in defensive air battles, but neither the Hurricane nor the Spitfire had the range needed for a true counter-offensive air campaign deep behind Japanese lines. The RAF lacked a long-range single-seat fighter, but in the autumn of 1943 American P-38 Lightnings and P-51A Mustangs arrived. Units thus equipped undertook numerous sweeps deep into central Burma during the first half of 1944, claiming many Japanese aircraft shot down and destroyed on the ground. Although the number of aircraft actually destroyed was less than the number claimed, the combination of the defensive air battles over the Arakan and Imphal and the American long-range fighter strikes allowed the Allies to regain air superiority and maintain it.

The author ends his book with subjects rarely covered in accounts of the air war over Burma and the Pacific, specifically the impact on the air war in Burma of the fighting in other areas and the structure and capability of Japan's aviation industry. Just as the RAF and USAAF in Burma suffered from low priority in the allocation of men and aircraft, reinforcements that might have gone to IJAAF units in Burma were increasingly diverted to China, the Pacific and home defence as the war went on. Japan's aviation industry was incapable of producing aircraft in anything like the quantities needed. Preston-Hough argues that the IJAAF had a narrow view of air





power that hindered its effective employment in Burma. In particular, he points out how the IJAAF tied its fighters to the role of supporting the Japanese Army rather than attacking the vulnerable Allied transport aircraft, which would have had a far greater impact.

This new work is highly recommended for anyone interested in the air war over Burma.

EDWARD M. YOUNG

Egitto dal Cielo 1914 (Egypt from the Sky 1914)

By Patrizia Piacentini; Università degli Studi di Milano/ Phasar Edizione, Firenze, Italy; 10in x 8¼in (250mm x 210mm); softback; 144 pages, illustrated; €30 + p&p. ISBN 978-88-6358-303-8

CREATED BY a professor of Egyptology at the University of Milan to accompany a photographic exhibition, this handsome softback puts forgotten pioneering aerial photographer Theodor Kofler firmly back on the map. Born in Innsbruck, Austria, Kofler went to Egypt in 1903 or 1904 to seek his fortune and remained there until 1952, although all his aerial pictures were taken at the beginning of 1914. Indeed, Kofler may have been the first person to photograph Egypt's ancient monuments from the air — although the honours may equally go to British aviator Francis McClean, who flew up the Nile from Alexandria to Khartoum during the same period.

This well-illustrated dual-language book, in Italian and English, tells a ten-year detective story which stemmed from the acquisition of an album of Kofler's aerial pictures by the University of Milan in 1999. It comprises chapters written by several contributors including Prof Piacentini, who opens her own chapter with the words, "Starting from 21 photographs, a name, and a date, we reconstructed the story of a man". And what a story — setting up a photographic studio in Cairo, flying in a Nieuport monoplane with Marc Bonnier to take pictures of the Pyramids of Giza, and with Louis Olivier in a Farman (before it was destroyed in an accident at the end of January 1914); internment in a prison camp on Malta for 16 months during World War One; escape from Egypt just before the 1952 Revolution; and final years spent in Kenya.

One chapter is devoted to the origins of civil aviation in Egypt; and another to the technical aspects of Kofler's aerial photographs — process, paper, type of camera etc. The book concludes with the album of photographs, all reproduced in good detail at full-page size.

After opening in Milan in February 2015, the exhibition of Kofler's work moved to Rome; it is due to travel to other venues in Italy and beyond until 2018.

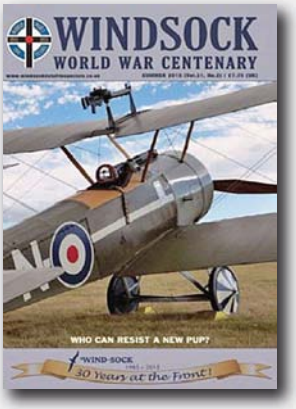
Writing as someone who has attempted to photograph some of Egypt's ancient monuments from the open cockpit of a Vickers Vimy (albeit in 1999, not 1914), I feel a special affinity with Kofler, so I am probably biased: but I heartly recommend this fascinating and unusual book.

MICK OAKEY

Retribution and Recovery: German Aircraft and Aviation 1919 to 1922

By Lennart Anderson and Ray Sanger; Air-Britain, Causeway House, Chiddingstone Causeway, Tonbridge, Kent TN11 8JP; 8½in x 12in (216mm x 305mm); hardback; 287 pages, illustrated; £39.95 to Air-Britain members, £59.95 to non-members. ISBN 978-0-85130-467-0

SOME MIGHT THINK that aviation in Germany was moribund after the First World War, and that thousands of German and Austro-Hungarian combat aircraft were just reduced to scrap. A lot were, but many were dispersed around the world, and this book reveals what really happened. In



nine chapters the authors of this impressive volume recount the events of the early inter-war years as they affected German aviation and the aviation industry; a story that has never before been told in such detail.

A scene-setting survey of the historical background and a chronology of events is followed by an account of the disarmament processes following the Armistice and then the Peace Treaty is covered. The fourth chapter provides an account of the military aircraft and airships used by the Entente powers and the USA, with listings by manufacturer and individual aircraft identities.

Chapter 5 looks at the lot of the German aircraft industry, covering wartime production and the adaptation of military aircraft for post-war civil use, while the next chapter examines German military and paramilitary operations. Next comes an account of early post-war German airlines and civil aviation, followed by a survey of the German and Austro-Hungarian aircraft used by the other Central Powers. The concluding chapter deals with the use of German and Austro-Hungarian aircraft in other countries and relates how they reached their destinations.

The comprehensive text is supported by maps and an impressive number of useful tables providing listings that would otherwise have made the text cumbersome. Perhaps most impressive of all, at least initially, is the truly astonishing collection of illustrations accompanying the text, well reproduced on glossy paper. A great many of these will be new to many readers. The terms and conditions of the various armistices and peace treaties are presented in an appendix, and there is a good index.

As well as recording a fascinating story, this volume will quickly become the standard reference for the subject and a mine of information for researchers concerned with both military and civil aviation in the early inter-war years. This period has hitherto been much neglected, probably because such information has never been so readily available before, and certainly not in a single volume.

PHILIP JARRETT

Comet: Unseen Images from the Archives

By Bruce Hales-Dutton; Danann Publishing Ltd, 6a Lonsdale Road, London NW6 6RD; 10¾in x 11in (274mm x 277mm); hardback; 128 pages, illustrated; £29.99. ISBN 978-0-99301-692-9

THE HISTORY OF the de Havilland D.H.106 Comet, from the euphoria with which it was greeted to the despair generated by the crashes which led to its being withdrawn from use, re-emerging as what was, in effect, a different aircraft, is well known to those with more than a passing interest in aviation. There have already been a number of books telling its story and any new volume now needs to take a fresh approach if it is to make an impression.

This new publication retells the history of the Comet in a workmanlike manner, but perhaps the key to its *raison d'être* is in the subtitle, as it contains a large number of images in both monochrome and colour, many of which have not been published before, and which capture the atmosphere of the time. Sadly some of the photos used have not been cleaned of dust, blobs and assorted detritus, which mars their appearance somewhat. This is all the more noticeable on what would have been stunning images. A good example is the dramatic head-on view of a Comet 4 which seems to have been "cleaned" with a much-used duster. Digital enhancement could easily have dealt with this issue.

The text is easy to read and sets out in a logical historical manner the full history of the Comet and includes panels telling briefly of people or airlines connected with it. There are a few factual

WINDSOCK WORLD WAR CENTENARY

Edited by Ray Rimell; Albatros Productions Ltd, 10 Long View, Berkhamsted, Hertfordshire HP4 1BY; 11¾in x 8¼in (297mm x 210mm); softback; 32 pages, illustrated; £7.75 (or £37 for annual UK subscription covering 4 issues, inc p&p). ISSN 2054-5754. Website www.windsockdatafilespecials.co.uk

PERHAPS BETTER known as *Windsock Worldwide*, this splendid niche quarterly for modellers of World War One aircraft is part-renamed for the duration of the Great War centenary period. The Summer 2015 issue (Autumn's should be available by the time this review appears) includes regular news on kits, books and full-size aircraft preservation and replicas; a gallery of readers' models (the standard is breathtaking); reviews of kits, books, accessories (1/32nd-scale photo-etched brass wing and tail-surface frames for a Fokker Eindecker, anyone?) and transfers (we don't call them decals in *TAH)*; and kit- and scratchbuilding masterclasses.

Special features include an article on the rather endearingly comical-looking LFG V19 Putbus shipboard spotter floatplane for use from (surfaced) U-boats, which includes superbly crisp scale drawings in two scales by Martin Digmayer; a three-page portfolio of detailed walk-round colour photographs of the first of a batch of Sopwith Pup replicas built by The Vintage Aviator Ltd in New Zealand; some fine Pup colour profiles by Ronny Bar; and an appreciation of the late aeromodeller Bill Rimell. **MICK OAKEY**

errors, which should have been picked up by better proofreading; for example test pilot John Cunningham went to Whitgift School in Croydon, not Whitchurch School as stated, and the cost of a gallon of jet fuel is quoted as being 1s 5d in 1959, which is translated as being 18p, instead of 7p.

An unusual approach is that the book also includes a DVD entitled *Air Accident Investigation and Escape*. The sections devoted to the investigation into the cause of the famous series of crashes comprise a number of official films detailing the painstaking steps taken at Farnborough to identify what had occurred and are of relevant historical interest. The remainder of the disc is made up of various films relating to escaping from military aircraft and is really not appropriate to the story of the Comet or any other airliner.

With a little more attention, this could have been a more impressive offering; but, to use a nautical illustration, seems to have been spoilt for the want of the proverbial "ha'p'orth of tar".

FRED CROSSKEY

I Won't Be Home Next Summer

By Ron Selley & Kerrin Cocks; 30° South Publishers (Pty) Ltd, 16 Ivy Road, Pinetown 3610, South Africa; 9in x 6in (230mm x 150mm); softback; 192 pages, illustrated; R185 + p&p. ISBN 978-1-920143-94-7

A BIOGRAPHY of Flight Lieutenant R.N. "Ronnie" Selley DFC — a South African in the RAF — co-written by his eponymous nephew, this book charts the life, flying career and untimely death in 1941 of a man credited with being the first RAF pilot to sink a U-boat in World War Two. Selley went on to win his DFC while flying a Lockheed Hudson in an action against a large force of Junkers Ju 87s on June 1, 1940, during the evacuation of Dunkirk.

After an unpromising opener (in the shape of a horribly and inexplicably mangled version of John Gillespie Magee's very well-known poem *High Flight*) and some historical scene-setting, the story gets into its stride with Ronnie learning to fly in 1937, joining RAF Coastal Command and getting into the thick of the action upon the onset of war.

Some uncertainty surrounds the sinking of the U-boat, but the Dunkirk action is an unequivocal model of valour. After attacking a formation of 40 Stukas, three of which he and his crew shot down, Selley was on his way back to base when he spotted two lifeboats full of soldiers, to which he guided a tug. He then dispersed another force of enemy aircraft before heading home.

Selley's bravery is undoubted, but sadly a price was exacted in terms of acute battle fatigue; after a period of convalescence he transferred from offensive ops to become personal pilot to Air Vice-Marshal Charles Breese, AOC 18 Group. He died when the Hudson he was piloting, with Breese and two other crew aboard, crashed at Wick in Scotland.

Plenty of quotes from personal letters and squadron Operations Record Books lend immediacy to the story while at the same time publishing primary source material, but the overall effect is spoilt by numerous crass clangers in the captioning of the often small and badly-reproduced photographic illustrations. A Hawker Fury and what looks like a de Havilland Moth Major are both labelled Puss Moth; an Airspeed Envoy is labelled Avro Anson; a Hawker Audax is labelled Fury; a D.H.60 variously a Puss Moth and a "Gypsey Moth" (for heaven's sake don't let the Secretary of the de Havilland Moth Club see this!); a Blackburn Shark labelled Avro Tutor — the bloopers go on and on.

In summary, though, if you can steel yourself to ignore the careless mistakes around its periphery, this is a story worth reading.

MICK OAKEY

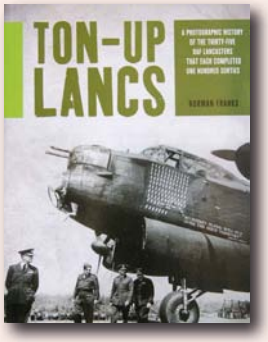
BOOKS IN BRIEF

A quick round-up of what else is currently available for the aviation history enthusiast

WINDSOCK DATAFILE 168: "HAWA"! VOL 1
Ray Rimell & Harry Woodman
Albatros Productions; ISBN 978-1-906798-30-7; £11.95

KICKING OFF a two-part study of the Hannover Cl II/IV/IIIA series, this 32-pager contains excellent scale drawings, rare photographs and colour artwork, well up to the publisher's consistently very high standard. Part of the detailed 1918 Ministry of Munitions report on a captured Cl II, originally published in *Aeronautical Engineering,* is also reproduced. Co-author Woodman died during the inevitably lengthy production process, and the two volumes are fittingly dedicated to his memory. **MO**

TON-UP LANCS
Norman Franks
Grub Street; ISBN 978-1-90980-826-3; £12.99

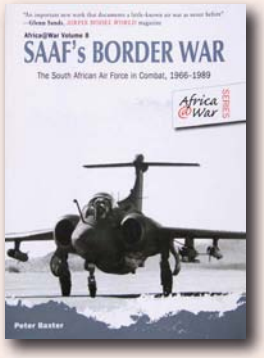


ORIGINALLY PUBLISHED as a hardback in 2005, *Ton-up Lancs* is a photographic history of the 35 RAF Avro Lancasters that completed 100 wartime operational sorties. This revised and expanded paperback edition contains a great deal of new information. An excellent resource for researchers, with comprehensive listings of every sortie undertaken by these "centurions", it also includes testimony from those who were tasked with flying them on their perilous adventures. The text could have used a more thorough edit ("Quantas"?) but the wealth of hard info contained within, at an affordable price, makes this a valuable addition to the historian's bookshelf. **NS**

TRIALS AND ERRORS: Experimental UK Test Flying in the 1970s
Mike Brooke
The History Press; ISBN 978-0-75096-160-8; RRP £14.99

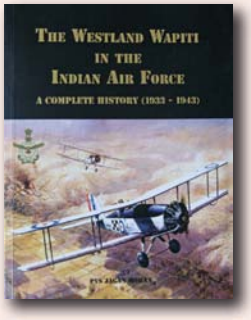
THE THIRD collection of highly-readable memoirs from Mike Brooke's long and distinguished RAF career, this picks up where his second volume, *Follow Me Through*, left off, and details the author's five years of test flying at the Empire Test Pilots' School. A thoroughly enjoyable read it is too; if only the publisher had put more effort into its cover and presentation. **NS**

SAAF'S BORDER WAR: The South African Air Force in Combat, 1966–1989
Peter Baxter
Helion & Company Ltd; ISBN 978-1-90891-623-5; RRP £19.95



SET AGAINST the backdrop of the Cold War, the eighth volume of Helion's superb *Africa @ War* series details the efforts of the South African Air Force to contain the Soviet Union's attempts to establish a communist regime in the south of the continent using its surrogates. Dogfights between SAAF Mirages and Cuban MiG-23s and "hot extractions" by helicopter of infiltrators deep in enemy territory are just two of the remarkable exploits featured in this excellent account of South Africa's little-covered "Border War". **NS**

THE WESTLAND WAPITI IN THE INDIAN AIR FORCE A Complete History (1933–1943)
PVS Jagan Mohan
Ambi Knowledge Resources Pvt Ltd; ISBN 978-8-19035-914-6; RRP £26.99 + £5 p&p (within UK)



EXACTLY WHAT it says on the tin, this is a comprehensive history of the Wapiti in India. Unfortunately, Juanita Franzi's superb artworks are let down by poor layout and reproduction; the upside, however, is that it is unquestionably the most in-depth and accurate coverage of the subject that is ever likely to surface. Taking both factors into consideration, this 224-page tome is the definition of a curate's egg. Limited availability; visit www.aviation-bookshop.com **NS**

BETTER BY DESIGN: Shaping the British Airways Brand
Paul Jarvis
Amberley Publishing; ISBN 978-1-44564-283-3; £17.99

WITH ACCESS to one of the world's finest collections of airline memorabilia, it's a mystery why British Airways (in association with Amberley) chose to present some of its magnificent treasures in this small landscape-format paperback; the material would be far better served in a portrait-format A4 hardback. Several of the images have also been criminally cropped to bleed off the page. Such needless philistinism is at least redeemed to some extent by the author's characteristically informative text. **NS**

Lost & Found

PHILIP JARRETT explores the lesser-known corners of aviation history, discovering unknown images and rediscovering long-lost details of aircraft, people and events. This time he tells the story behind a recently-acquired photograph of a late-1920s Belgian rarity

DURING THE INTER-WAR years in England most of the small joyriding concerns used the ubiquitous Avro 504 and its variants to give people their *baptême de l'air*; or perhaps the angular de Havilland D.H.6. In France, too, war-surplus biplanes were employed, such as Sopwith 1½-Strutters or two-seater Nieuports.

Rather more unusual was the aircraft seen here, which performed similar work in Belgium, on the beach at Wenduine, a seaside town in the country's West-Vlaanderen region. This machine, Renard-Stampe-Vertongen RSV 32/100 trainer OO-AJF, powered by a five-cylinder 100 h.p. Renard air-cooled radial engine, was initially registered as O-BAJF on July 13, 1928. Designed originally for the Stampe et Vertongen flying school and inspired by the British Centaur IV, the RSV 32 was the first aircraft of entirely Belgian design and manufacture to enter service, seeing both military and civil use.

One of at least eight RSV 32/100s built, O-BAJF was acquired by Mr Henry Abeele of Ostend, who had started a flying school at Stene-Oostende airfield in May of that year. That summer, Abeele organised "beach flights" at Wenduine. Granted Certificate of Registration No 148 on March 1, 1929 and re-registered OO-AJF on April 12 that year, the aircraft apparently had a long life, its registration not being cancelled until March 26, 1946 (although it might have ended its flying life before the outbreak of the Second World War). Abeele is at the controls in the front cockpit in the photograph below, taken in 1929.

Different strokes

More on that Ruston six-stroke engine mentioned in *Lost & Found* in Issues Nos 5 and 7 of *TAH* has turned up. Sandy Skinner, a "learned friend" of aviation book dealer Brian Cocks, has found a reference in a paper written by A.E. Chorlton in the *Journal of the Royal Society of Arts, No 3589 Vol LXIX*, which states: "The author, in 1915, designed engines of the differential type and subsequently an eight-cylinder six-stroke engine of 250 h.p. was constructed". Figure 17 in the journal shows a cross-sectional drawing.

Brian comments: "I imagine that this dating would put it in the period in which Chorlton was working at the Ministry of Munitions, and well before he moved to Beardmore in 1918. He would presumably have gone back to his old employer, Ruston, to get it built. This is the first reference I have seen confirming that Chorlton was the designer, and that the engine was built from his designs. Sandy also found some more patents showing that Chorlton was researching the use of inter-cylinder ducting to transfer pressure from the 'spare strokes' of the six-stroke engines to supercharge other cylinders (see US Patent 1,319,756), but this was dated 1919, so he was still inventing after he went to Beardmore."

BELOW ***With the aircraft's 100 h.p. Renard engine running, Henry Abeele prepares to take another joyrider aloft in Renard-Stampe-Vertongen RSV 32/100 O-BAJF, later registered OO-AJF, in 1928. The aircraft was apparently inspired by the Central Aircraft Company Ltd's Anzani radial-engined Centaur IV three-seat biplane trainer.***

RUSSIA'S REAL FLYING TANKS

Use the term "Russia's flying tank" and you're probably talking about the heavily armoured World War Two-era Ilyushin Il-2 Sturmovik; much less well-known, however, is the Soviet Union's early 1930s development of actual winged tanks intended for front-line deployment. **VLADIMIR KOTELNIKOV** details the complete story for the first time, exclusively for *TAH*

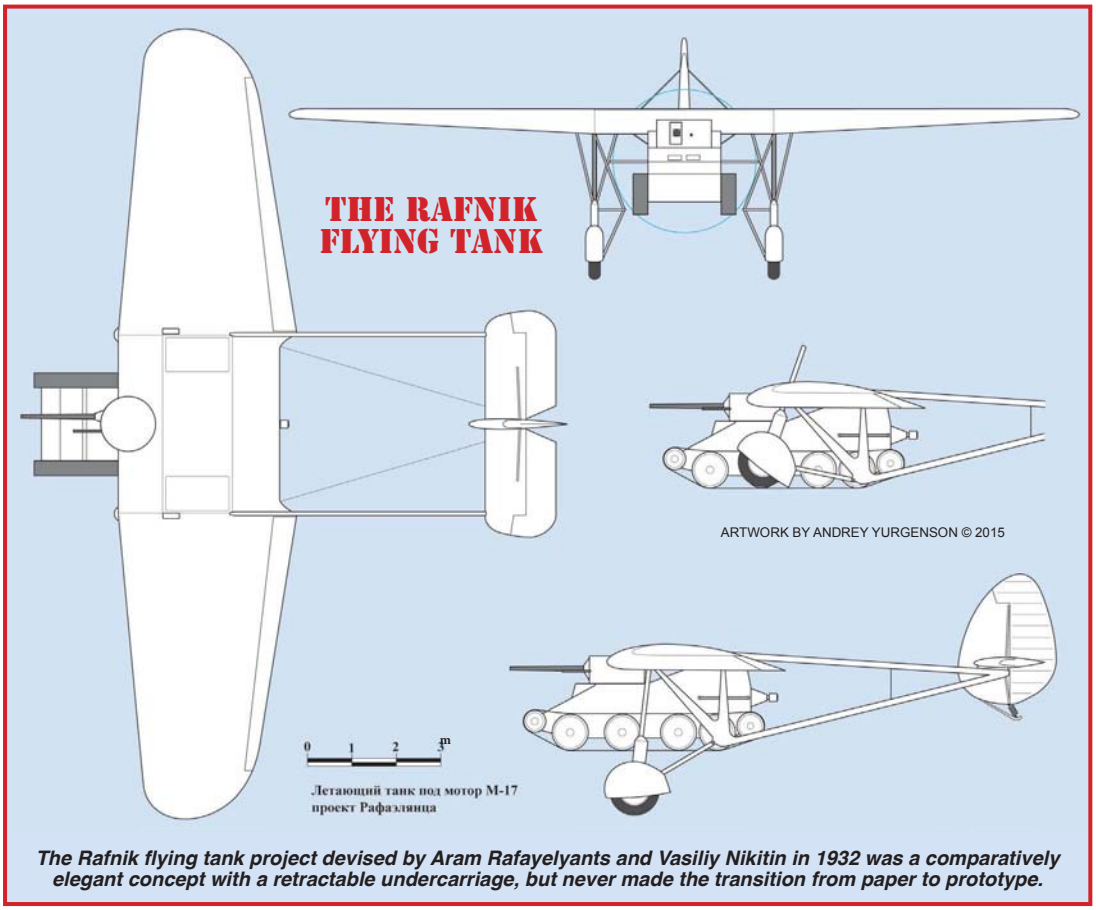
AMERICAN TANK designer J. Walter Christie first came up with the idea of a "flying tank" at the beginning of the 1930s. He proposed adding wings and a tail to a tank, using the latter's powerful engine to drive a propeller, thus turning it into a unique aircraft. Christie willingly shared his thoughts with journalists, who began to write about how an armada of flying tanks could cross the front line, jettison their wings and tails and attack the enemy from behind their own lines. The newspapers dubbed them a "fearsome and deadly weapon of war". Encouraged, Christie set about creating a tank weighing 4–6 tonnes (3·95–5·9 tons), armed with a 76mm (3in) gun, to which a biplane airframe could be mounted with a propeller on the upper wing, linked via a driveshaft to the tank's engine.

The Soviet military naturally took a great interest in this innovation. At that time the concept of airborne infantry was still in its infancy, but from the outset the idea had been to equip such forces with armoured vehicles. However, the means to transport such vehicles by air did not yet exist.

THE "RAFNIK"

Soviet designs based on Christie's idea soon began to emerge. Designed by Aram Rafayelyants and Vasiliy Nikitin, the "Rafnik" conformed to the basics of the American design but employed a monoplane layout with its own undercarriage which could be retracted when loading or

TOP ***Based on an original Soviet illustration depicting the use of the Rafnik flying tank on the battlefield, this specially-commissioned artwork by TIM O'BRIEN GAvA shows the intended role of the craft, which was to land behind the front line and attack the enemy from the rear. For more info on the artist visit www.timobrienart.co.uk.***



The Rafnik flying tank project devised by Aram Rafayelyants and Vasiliy Nikitin in 1932 was a comparatively elegant concept with a retractable undercarriage, but never made the transition from paper to prototype.

unloading the tank. In the design drawings the tank was very similar to the Red Army's convertible BT-2, which could run on tracks or its wheels, and which had just entered series production. It was not a surprising choice — the running gear on the BT-2 was manufactured under a licence acquired by the Soviet Union from Christie in April 1930. The engine in the flying-tank design, however, was to be much more powerful. The Mikulin M-17 liquid-cooled V12 aircraft engine was a copy of Germany's BMW VI, while the BT-2's standard M-5 engine was based on the less powerful American Liberty powerplant. *[For the full story of the M-5 see the author's* "At Last We Have Our Very Own Soviet Engine" *in TAH11 — Ed.]* The M-17 was to drive a two-bladed pusher propeller, a guard for which was attached to the armour at the rear.

The pilot, who was also the driver, sat in his usual position in the front of the tank. In flight the engine was fed with fuel from two tanks in the wing centre section. The maximum speed of the flying tank in flight was estimated to be approximately 150–160km/h (93–100 m.p.h.). After landing, a member of the tank crew would push a lever, at which point the undercarriage legs would retract and the tank would lower down on to its tracks; at the same time the latches that attached the tank to the airframe would come undone. The propeller did not detach, but was stowed horizontally.

Rafayelyants and Nikitin proposed that the tank return to the airframe after the battle, to be reattached and fly on to another sector of the front line. The design documents state that the range of the tank was 300km (185 miles) but when overloaded this could be up to 400km (250 miles). It was to remain a "paper project" only.

A TANK GLIDER

A group of specialists at the *Tsentrainiy Aerogidrodinamicheskiy Institut* (TsAGI — Central Aero & Hydrodynamics Institute), Messrs Yermonsky, Solovyov and Matsyuk, proposed that a tank be delivered to the battlefield as part of a glider that would be towed by a suitably powerful aircraft. The only modifications the tank would require in this case would be attachment points for the wings and tailboom and fin.

The glider was of monoplane configuration with a high-aspect-ratio wing with a span of 36m (118ft). This would be placed above the tank in a parasol configuration; a pylon made of tubes and struts would provide an additional attachment to

J. Walter Christie (far right, pointing) demonstrates the tank element of his M-1932 flying tank design to the members of a military commission in the USA in 1932. The wingless and turretless prototype proved to be fast on paved surfaces using its untracked wheels, but the concept of a flying tank was not deemed worthy of further exploration in the USA.

ALL IMAGES VIA AUTHOR AND GENNADY PETROV

the fuselage. The glider had a single-spar wing made entirely of wood with a plywood skin, which was fitted with ailerons, as well as fixed leading-edge and slotted trailing-edge flaps. The tailboom and fin, which were also made of wood, were to be attached to the aft section of the tank. The only way the tail was linked to the wings was via the tank itself.

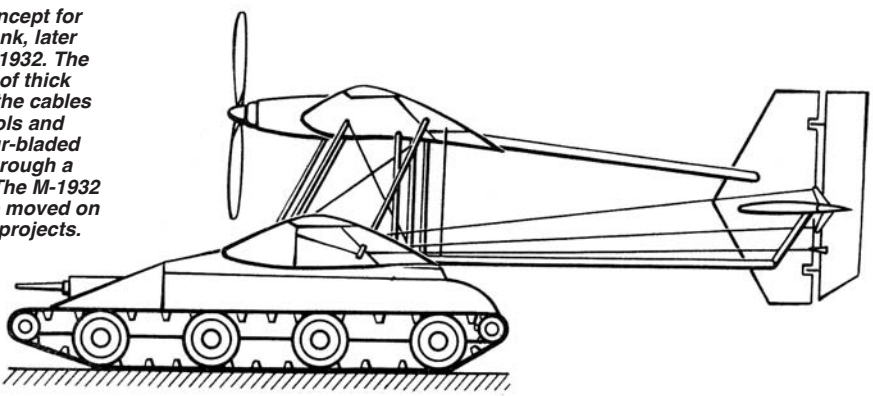
It was proposed that the tank's own tracks or wheels would be used for take-off and landing. The glider would be controlled by the principal gunner, since on take-off the driver would accelerate the tank to its maximum speed, and on landing would set the tank tracks in motion ahead of touchdown. The weight of the tank itself in the initial variant was set at 6–8 tonnes, with the glider weighing in at two tonnes. Consideration was given to using the Tupolev TB-3 four-engined monoplane bomber as a towing aircraft.

After landing the tank's crew would open seven catches, thus releasing the wing and tail. The advantage of this approach was the use of a standard production line tank with a standard engine. The downside, however, was that the tank would take off and land on its own chassis.

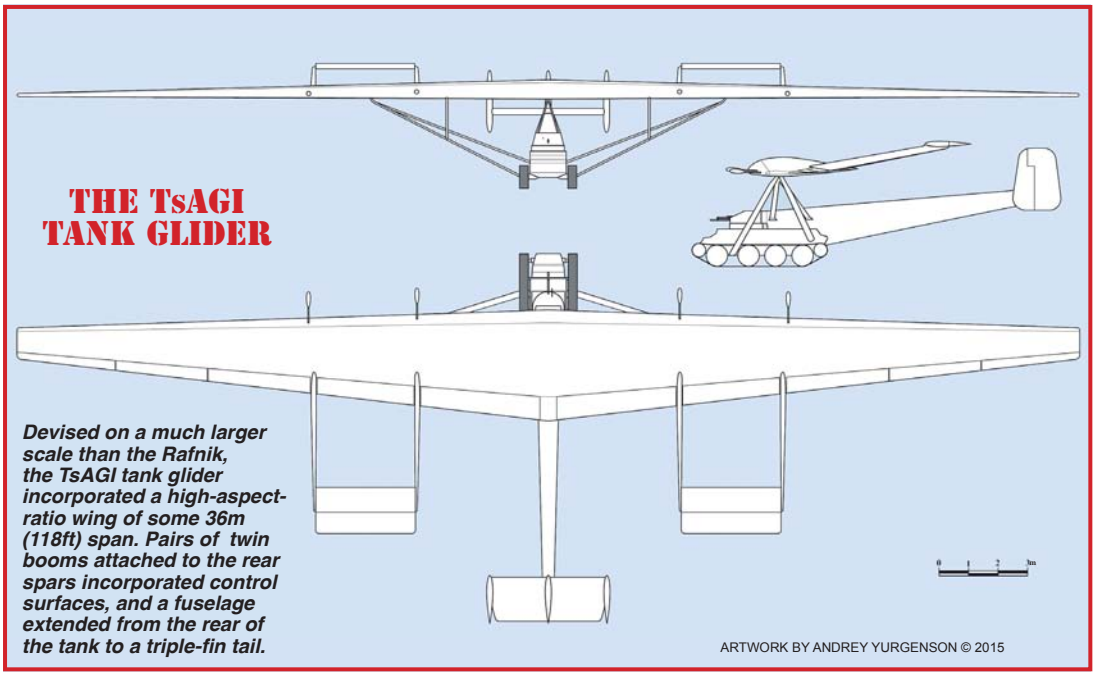
According to the designer's estimates the vehicle would need to reach a somewhat optimistic 100km/h (63 m.p.h.) on take-off. At the time this speed was unthinkable for a tank. Contemporary tanks were capable of reaching a little over 50km/h (30 m.p.h.) on tracks and up to 75km/h (45 m.p.h.) using a wheeled chassis. The designers subsequently settled for a take-off speed of 80km/h (50 m.p.h.), which was more realistic — but not much.

KAMOV'S "JUMPING TANK"

The most exotic Soviet flying-tank project was proposed in September 1932 by Nikolai Kamov, later to make his name as a helicopter designer. He proposed a "heli-tank", which, on close inspection of the design document, was not



Christie's original concept for a three-man flying tank, later developed into the M-1932. The biplane wings were of thick aerofoil section, with the cables for the flying controls and driveshaft for the four-bladed propeller passing through a central strut housing. The M-1932 never flew and Christie moved on to other tank-related projects.

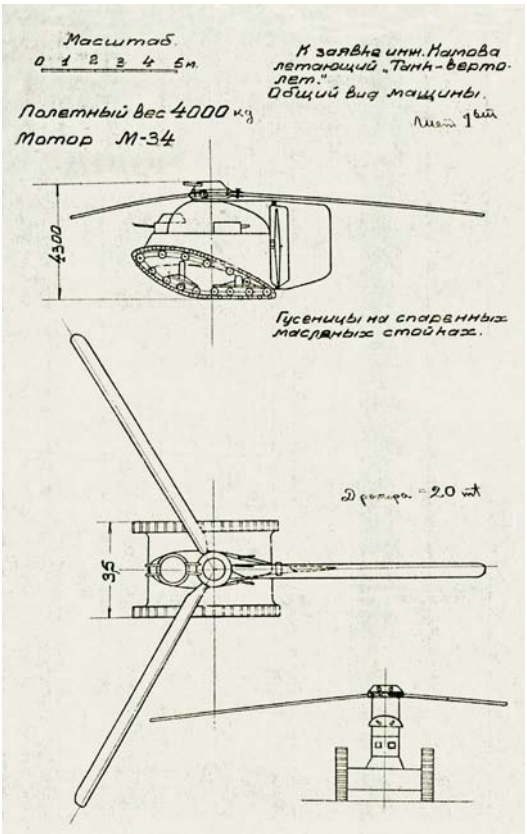


actually a helicopter but an autogyro. If the other designs owed something to a greater or lesser extent to Christie, then Kamov's design was totally different.

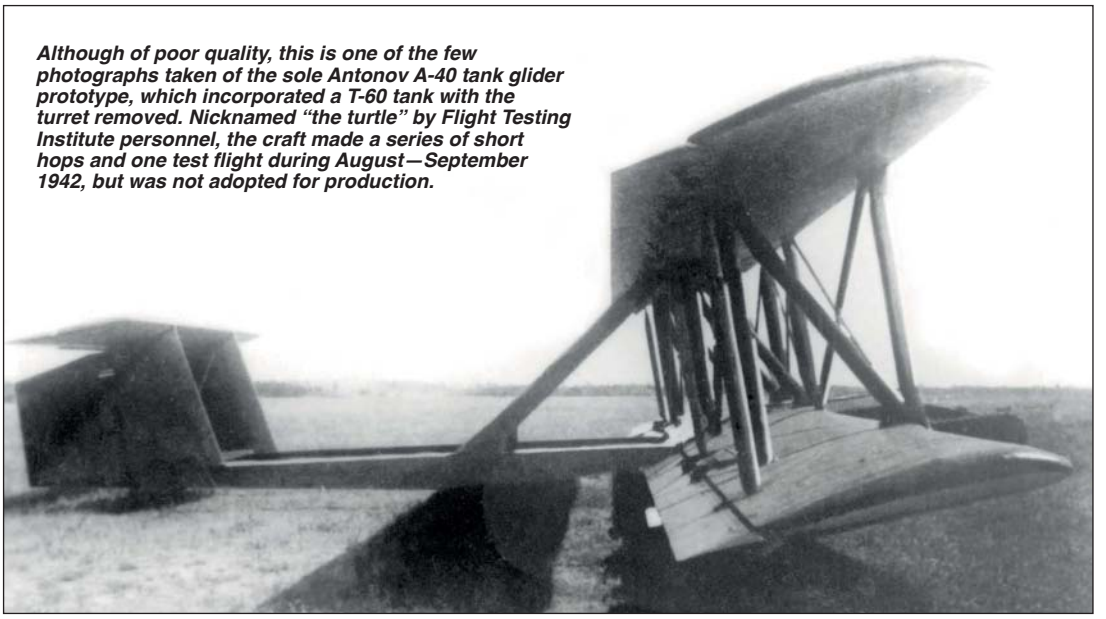
Kamov's was purely a tracked design, and the underside was wide and low to the ground. Above this was a superstructure with a teardrop-shaped cross-section. The designer chose the newest Soviet aero-engine available at the time, the 800+ h.p. Mikulin M-34, which would drive a pusher propeller, beyond which was a rudder. Kamov's machine was a so-called short-take-off "jumping" autogyro.

The three-bladed lifting rotor, which had a diameter of 20m (65ft 7½in) and was mounted on top of the superstructure using a rotorhead, was designed by Kamov. The diameter of the rotorhead meant that a circular turret could be mounted above it fitted with two machine-guns. A second such turret, also fitted with a pair of machine-guns, was located in front of the superstructure. Another two barrels fired aft and to the left and right of the pusher propeller from inside the superstructure. The craft was to have a crew of two, and its flight weight was to be 4,000–4,500kg (8,800–9,900lb).

In a later iteration Kamov proposed converting the autogyro into a helicopter with a rotor diameter of 30m (98ft 5in), larger than that of the autogyro. On the basis of calculations, however, the flight performance characteristics turned out to be worse than the autogyro and so the designer rejected this variant and focused on the autogyro alone. He proposed that it would be able to take off from a short runway — promising a take-off run of no more than 50m (165ft) — and



ABOVE ***A contemporary document detailing the essentials of Nikolai Kamov's intriguing "heli-tank" concept, actually a heavily-armoured autogyro bristling with machine-guns. The craft's Mikulin M-34 powerplant was rated at 820 h.p. at 1,850 r.p.m.***



Although of poor quality, this is one of the few photographs taken of the sole Antonov A-40 tank glider prototype, which incorporated a T-60 tank with the turret removed. Nicknamed "the turtle" by Flight Testing Institute personnel, the craft made a series of short hops and one test flight during August—September 1942, but was not adopted for production.

would fly at a speed of 150km/h (93 m.p.h.). The autogyro could land almost anywhere as it had a landing roll of 5m (16ft). After landing, the crew would fold the rotor blades to the rear by hand but without climbing out of the tank, and then proceed into battle. The machine was to have a maximum speed of 35–40km/h (20–25 m.p.h.) on land. If it were to encounter any significant obstacle the craft would be able to climb into the air again and jump over it — in theory.

The stumbling block for all these projects was the tank itself. Kamov's design called for a whole new vehicle to be manufactured from scratch. He drew up a long list of specialists whose expertise would be required for the project. Initially Kamov intended only to develop a small autogyro to test and fine-tune the proposed rotorhead, but even this the specialists deemed to be an exceptionally complicated task. Like the Rafnik and the TsAGI glider, Kamov's "jumping tank" never left the drawing board.

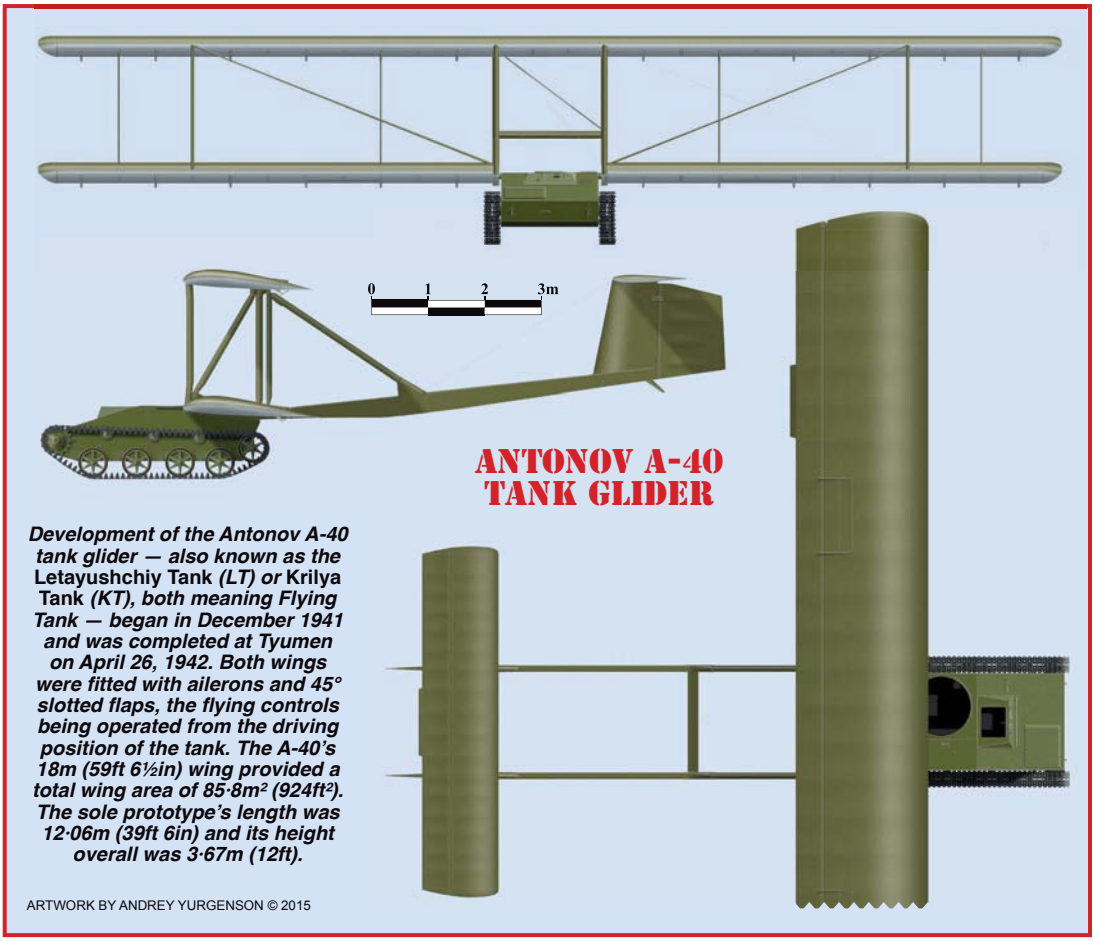
ANTONOV'S BIPLANE TANK GLIDER

Two other projects envisaged using a wheeled or tracked tank that was either readily available or which had been modified. No such vehicle, however, was available in the Soviet Union. The weight of the Rafnik was estimated at 4,550kg (10,030lb), of which the tank itself accounted for some 4,000kg (8,800lb). The tank component of the TsAGI glider-based was to weigh 6,000–8,000kg (13,200lb–17,600lb). The aforementioned BT-2, however, weighed more than 11 tonnes (10·8 tons). As a result the aircraft manufacturers were tasked with designing a unit using a special tank along with a corresponding airframe. Unsurprisingly, development came to a standstill.

Negotiations began with Christie via the Amtorg company, at that time acting as a Soviet trade representative in the USA. It emerged that Christie had already rejected his own concept as unrealistic. The tank would not be able to get into the air even with a powerful aero-engine. The American designer had turned his attention to developing a combination incorporating a specially lightened tank and a carrier aircraft in co-operation with a company called Miller, but this never reached the prototype stage.

By the spring of 1933 all work on flying-tank design in the Soviet Union had been gradually run down. In its place, the development of external stores to transport equipment beneath heavy bombers was stepped up. By the mid-1930s the V-VS (Soviet Air Force) had equipment in service to deliver T-27 tankettes as well as T-37A and T-38 light amphibious tanks, the T-27 having the added advantage of being deliverable by parachute.

Following Germany's invasion of Russia in June 1941, Soviet designers turned their attention once again to the flying-tank concept, in the form of a new variant of Christie's design. By this time the TB-3 bomber, capable of transporting armoured vehicles by air, had become obsolete. No new type, however, had emerged to replace it. In December 1941 design work on the A-40 glider — incorporating a T-60 light tank — was completed at Oleg Antonov's design bureau in Tyumen, Siberia. The A-40's biplane wing had a span of 18m (59ft 6½in), from which twin tailbooms extended rearwards to fins linked by a tailplane. Skids were fitted to the rear of the tailbooms with a shock absorber, which protected the tail as the craft touched down. The A-40 was designed to land and take off using the tracks of its tank, which was able to manœuvre with the



Development of the Antonov A-40 tank glider — also known as the* Letayushchiy Tank *(LT) or* Krilya Tank *(KT), both meaning Flying Tank — began in December 1941 and was completed at Tyumen on April 26, 1942. Both wings were fitted with ailerons and 45° slotted flaps, the flying controls being operated from the driving position of the tank. The A-40's 18m (59ft 6½in) wing provided a total wing area of 85·8m² (924ft²). The sole prototype's length was 12·06m (39ft 6in) and its height overall was 3·67m (12ft).

ARTWORK BY ANDREY YURGENSON © 2015

glider unit attached at up to 15km/h (10 m.p.h.).

The pilot, who was also the driver of the tank, sat in his usual position at the front of the vehicle. It was proposed that he be provided with a periscope to improve his field of vision. The entire glider element's structure was made of wood; the wing roots had a plywood skin, while the rest was canvas. The glider was mounted on to the tank with the help of a specially-designed trolley and was attached at four points. It was jettisoned by the driver from inside the tank. The design weight of the A-40 plus tank was 7,804kg (17,205lb) of which the T-60 accounted for 5,800kg (12,785lb). The whole contraption was to be towed by a four-engined TB-3.

A prototype example of the A-40 was completed in April 1942 at Tyumen. The tank was lightened as much as possible, the turret was removed and the reserve of fuel was reduced. With one pilot/driver the A-40's take-off weight was 6,710kg (14,795lb). The glider and tank were ferried to the Flight Testing Institute airfield at Kratovo, south-east of Moscow, where the combination was assembled on July 22, 1942.

Flight-testing began from August 7, when test pilot Sergei Anokhin performed fast taxy runs and short hops, the glider lifting off at around 110–115km/h (68–71 m.p.h.). Following the hops, it was decided to take the glider up for a flight. The combination lifted into the air safely and began to gain altitude. Unfortunately the towing aircraft's engines started to overheat and a diversion was made to the neighbouring airfield at Bykovo, where Anokhin disengaged and landed with some difficulty.

On seeing the bizarre combination of aircraft and tank, spectators at the airfield scattered in all directions. Anokhin caused further panic when he started up the tank's engine and moved towards the airfield's buildings without jettisoning the glider component, prompting the airfield's anti-aircraft battery to prepare to open fire. Only then did Anokhin stop the aircraft and jump out. The unfortunate A-40 was dismantled once again and taken back to the airfield at Kratovo. It never flew again, thus ending the Soviet Union's attempts to create a real "flying tank".

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Fairchild UC-123K 57-6289 (c/n 289) provides an unusual spectacle for the locals on the roof of a garage forecourt at Bang Wua in central Thailand. Both engines have been removed but the propellers have been mounted on frames in the engine nacelles.

AUTHOR'S PHOTOGRAPHS

OFF THE BEATEN TRACK

Ever turned a corner to find something unexpected? The Aviation Historian's *intrepid aeronautical explorer* ***PETER DAVISON*** *investigates the stories behind the oddities that turn up in the most unusual places*

MOUNTED ON A garage forecourt below Highway 34 between Bangkok and Pattaya Beach in central Thailand stands this Fairchild UC-123K Provider. The vintage transport is almost invisible from the highway above, but closer inspection reveals it to be serial number 57-6289, the fifth-from-last of a total production run of more than 300 C-123s.

Developed originally from the Chase XCG-20 glider, the C-123, powered by a pair of Pratt & Whitney R-2800 Double Wasp piston engines, made its first flight in 1949 and entered USAF service in 1955, serving with the USAF's Military Air Transport Service (MATS).

In 1962 the first sprayer conversions were sent to Tan Son Nhut in South Vietnam for clandestine duties spraying various herbicides over heavily forested areas to reduce the tree canopy and improve aerial visibility. Most notable of these was "Agent Orange", so called because of a 4in (10cm) orange band on the 55 US gal drums. Only small amounts reached the ground, but Operation *Ranch Hand* (1962–71) was found to be useful by ground commanders in Vietnam. The addition of two General Electric J85 jet engines on the C-123K from 1968 vastly improved the type's survivability.

This UC-123K was eventually transferred to the Royal Thai Air Force, joining No 602 Sqn — the "Royal Rainmaking Unit" — with which it served until 1995. Stored at Don Muang until 1998, it was then moved to its current location on the garage roof at Bang Wua.

BELOW ***The Provider's Pratt & Whitney R-2800 Double Wasp engines are close at hand on the garage forecourt; installing these in a hot-rod might give the locals a buzz! To get a bird's-eye view of the vintage transport on Google Earth, enter the co-ordinates 13.54178, 100.96125 in the "Search" panel.***

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